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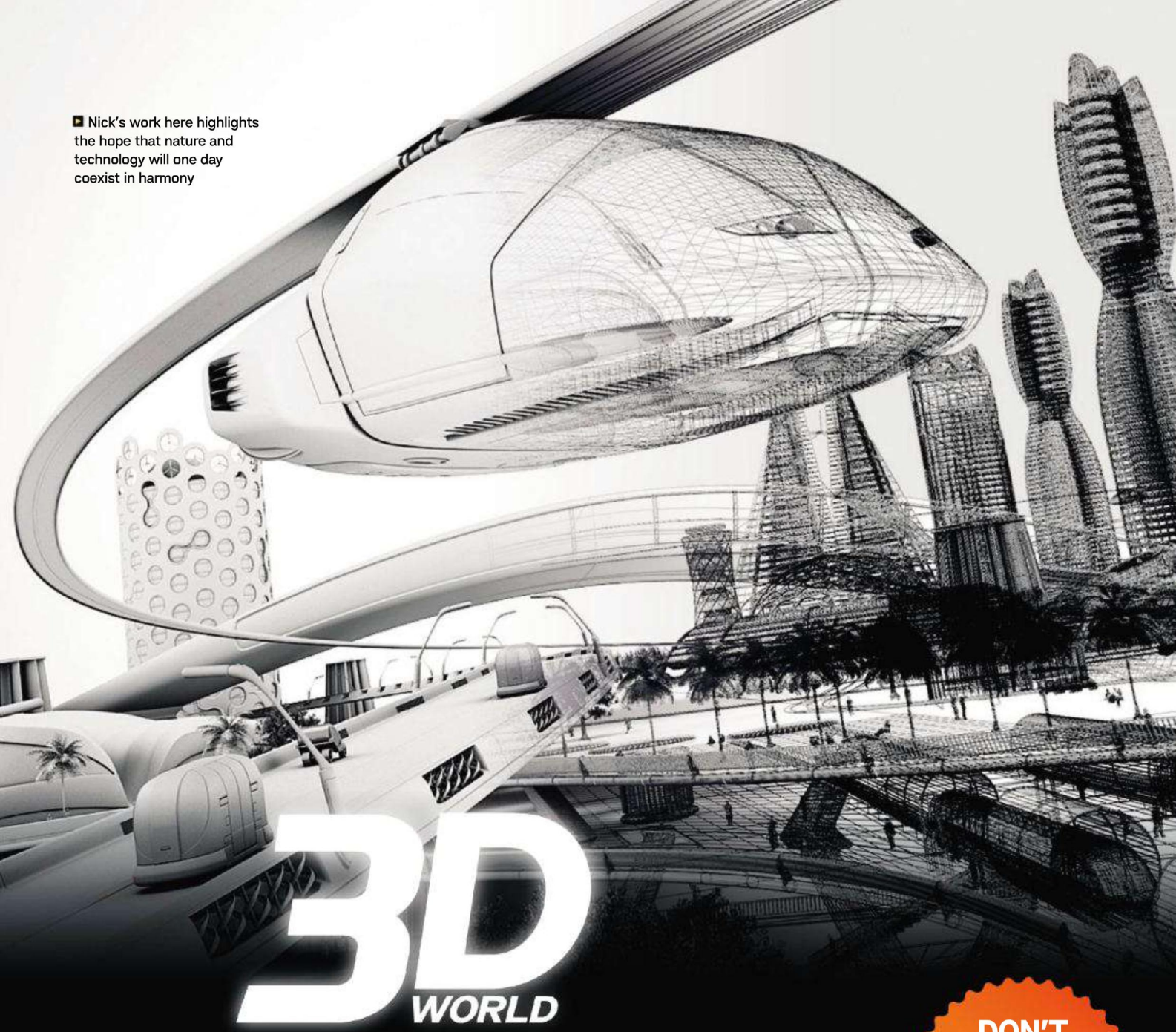

Nick's work here highlights the hope that nature and technology will one day coexist in harmony

3D WORLD presents

# Nick Kaloterakis

Nick Kaloterakis has worked as a senior 3D/VFX artist for over a decade in post-production. He's currently based in Sydney, where he runs his own design studio, Kollected. It's a place where he can work on his ambitions to "perfect the aesthetic value of the work I do and always take ideas and dreams to the next level of technical 'wow' factor". The results of his labours shine through in his stunning artwork, such as the image that graces our cover.

After eight years as the head of 3D at Engine, a post-production company in Sydney, what does he now see as the advantages of taking his own path? "Kollected has afforded me the opportunity to extend my skills and vision into a variety of areas and to work with young designers and artists keen to challenge traditional theories and explore the infinite possibilities of the 3D world," he says.

His work has been featured on the cover of Popular Science magazine for the past four years. It's also been used in campaigns by Sony, Qantas, Foxtel, The New York Times, National Geographic, Australian TV networks, Saatchi & Saatchi, and the Discovery Channel. What fuels his fertile mind, then? "I draw inspiration from a keen interest in photography, drawing and graphic design to provide the realistic intricacies required to deliver an exceptional piece of work," he says.

How about this image in particular? "This was the result of a brief by Popular Science magazine to create an eco-savvy blueprint for cities in the future," he reveals. "This dynamic vision of an urban environment highlights the hope that nature and technology will coexist and thrive."

**See more of Nick's work at www.kollected.com. He's also contactable at nick@kollected.com.**

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# Welcome to 3D WORLD

## The digital edition of our mag is coming to a screen near you...

This is my first real editorial of 2011 and to kick off the year, I'd like to start by introducing our new team members. First of all we have Kerrie Hughes, who comes to the magazine fresh from the world of finance, but with a love of CG and a first-class honours degree in computer graphics from Kingston University, where she spent a lot of time working on character modelling and rigging. Kerrie's wealth of CG knowledge and passion for animation (as well as a bizarre desire to write The Filter in our Pre-Viz section) will make her an invaluable member of the 3D World crew.

I'm also happy to welcome Rob Redman to the position of technical editor. As the person responsible for all the training on the mag, this is a key role and I'm confident Rob will be brilliant in it. Some of you may already know him from his work with Cinema 4D and Vue on his website at pariahstudios.co.uk. But while Rob uses C4D as his main app for personal use, he's well versed in Maya, LightWave, ZBrush and After Effects – and we'll soon bring him up to speed on all the other main apps too. As a modeller, animator, illustrator, compositor, motionographer and VFX artist, I'm confident Rob will help take our training to a whole new level!

### *Let's get digital...*

At last, by popular demand, you're now able to buy copies of 3D World digitally (to a chorus of "finally" from overseas readers). If you go to www.zinio.com/3dworld, you'll be able to purchase issue 139, which can be viewed on PC or Mac, and the iPad or iPhone, using one of the free Zinio reader apps. The price is a little cheaper than the newsstand print edition, but at the moment obviously we can't deliver all the disc content. Of course, if getting 3D World on day one is more important to you than the training material or disc freebies, then this is a great way to get hold of the mag – especially if you live in some far-flung corner of the globe.

We still hugely prefer the print version, but do let us know what you think of the digital edition and ways we might improve it in the future. But for now, enjoy 3D World, the good old-fashioned way...

**Steve Jarratt, editor**

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# Introducing our advisory board

*Each issue, our panel of leading figures from across the CG industry give us their advice and help*

Meet all of our advisory board members at **3dworldmag.com/board**

## Spotlight on...

### Jolyon Webb
**ART DIRECTOR, BLITZ GAME STUDIOS**

Jolyon Webb has spent the last decade on games development teams working as an art director and technical artist across a wide variety of titles, including stints at leading UK developers such as Codemasters and Blitz Games Studios, for which he is currently art director. His ongoing focus is on how to make realistic and stylised humans more engaging in games. He also plays a leading role in the company's Blitz Academy, contributing talks and tutorials to help the next generation of artists and developers. You can build your own game skills this issue with Christopher Plush's tutorial on low-overhead VFX in game levels (page 78) and Farhan Qureshi's tips and techniques for effects artists (page 72).



## This issue's contributors

### Anders Kjellberg
**FREELANCE 3D ARTIST**

Based in Sweden, Anders mainly works on still images for magazines, but branches out occasionally with motion graphics for Swedish television. On page 66, he introduces you to Cinema 4D R12's revamped physics engine in his tutorial.

### Christopher Plush
**DESIGNER, GIMMEDESIGN**

Alongside his design work, Christopher Plush is co-owner of the 3D training website cgmasters.net. He brings his expertise to bear in page 78's Blender tutorial, where he shows how to create in-game effects that won't tax the player's machine.

### Farhan Qureshi
**JOB & COMPANY NAME HERE**

Farhan has crossed from film effects, where he worked on three Harry Potter films, to games, where he's currently leading the VFX on Splash Damage's Brink for Xbox 360, PS3 and PC. Read his game effects tips on page 72.

### Marc Rice
**HEAD OF PAINT & ROTO, FRAMESTORE LONDON**

Marc has worked on the likes of Avatar, Harry Potter and The Chronicles of Narnia, removing stunt wires and much more. On page 100, he road-tests an update to tracking tool Mocha Pro.

### James Prosser
**VFX PRODUCER, ZOO**

About the author

James has worked on the Harry Potter and Chronicles of Narnia movie franchises, as well as David Attenborough's First Life. On page 104, he takes you behind the scenes of a stereo 3D dinosaur documentary for Sky.


3D WORLD

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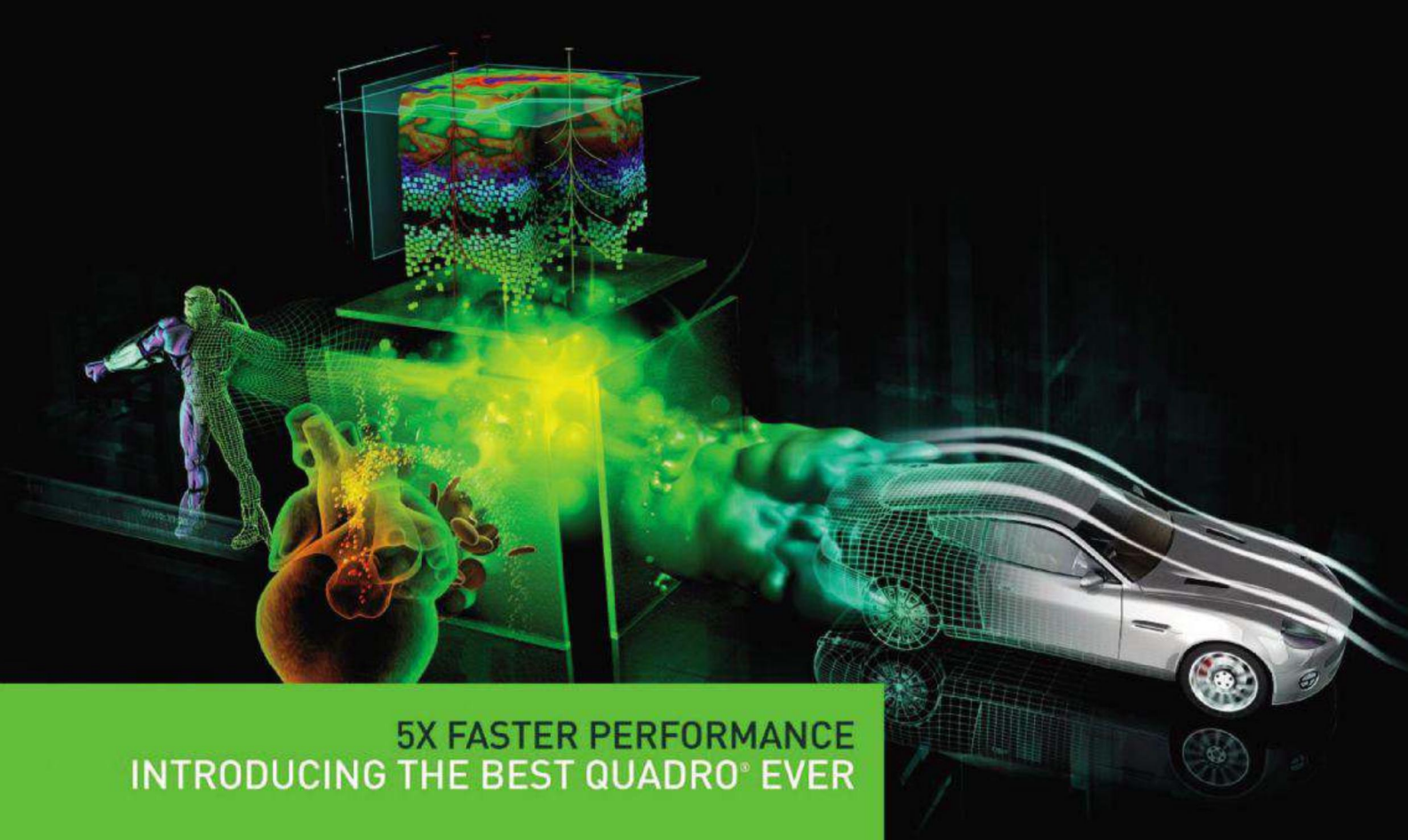

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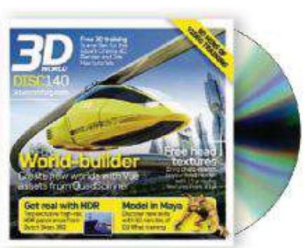


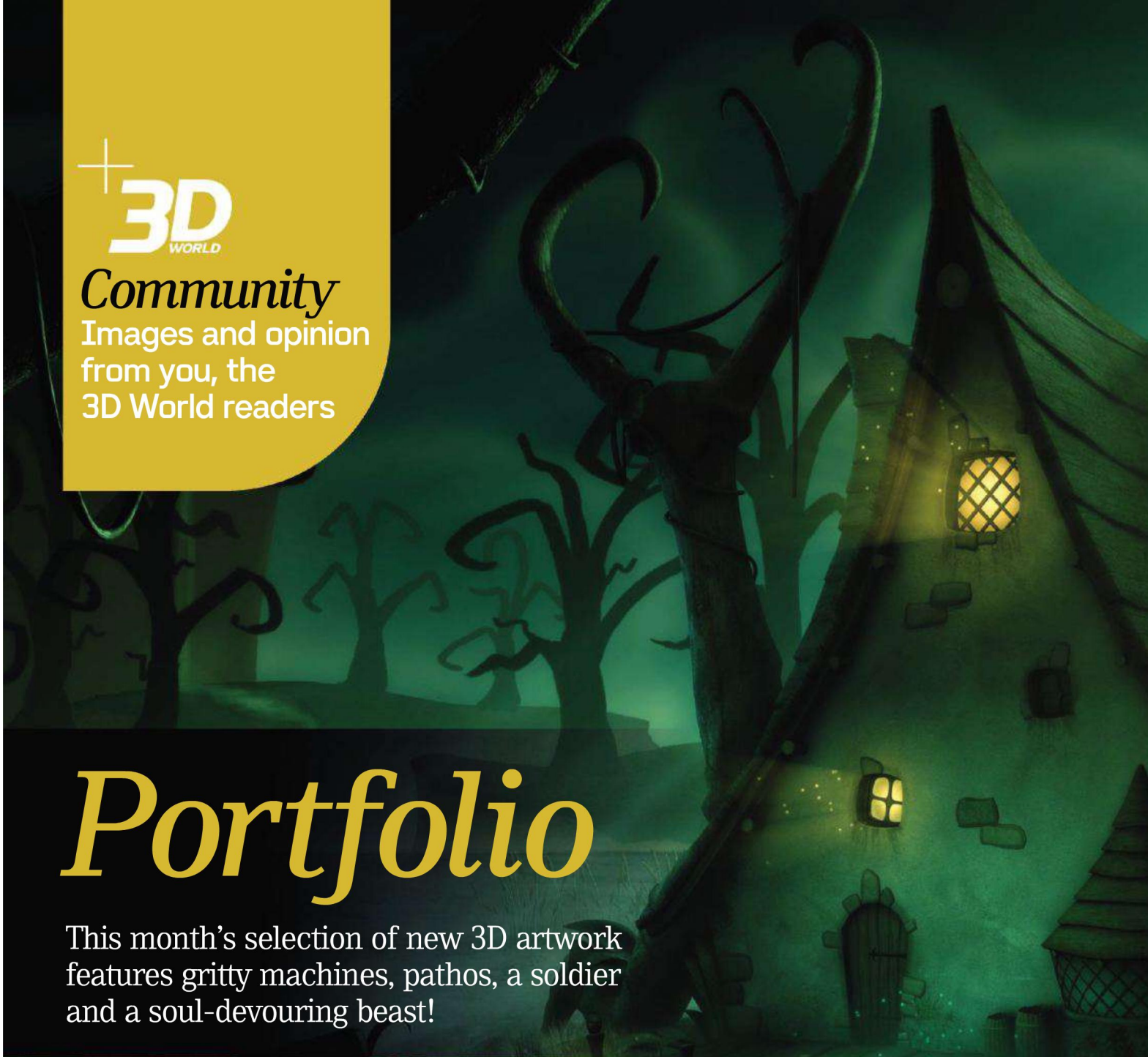
3D WORLD

# Community

Images and opinion from you, the 3D World readers

# Portfolio

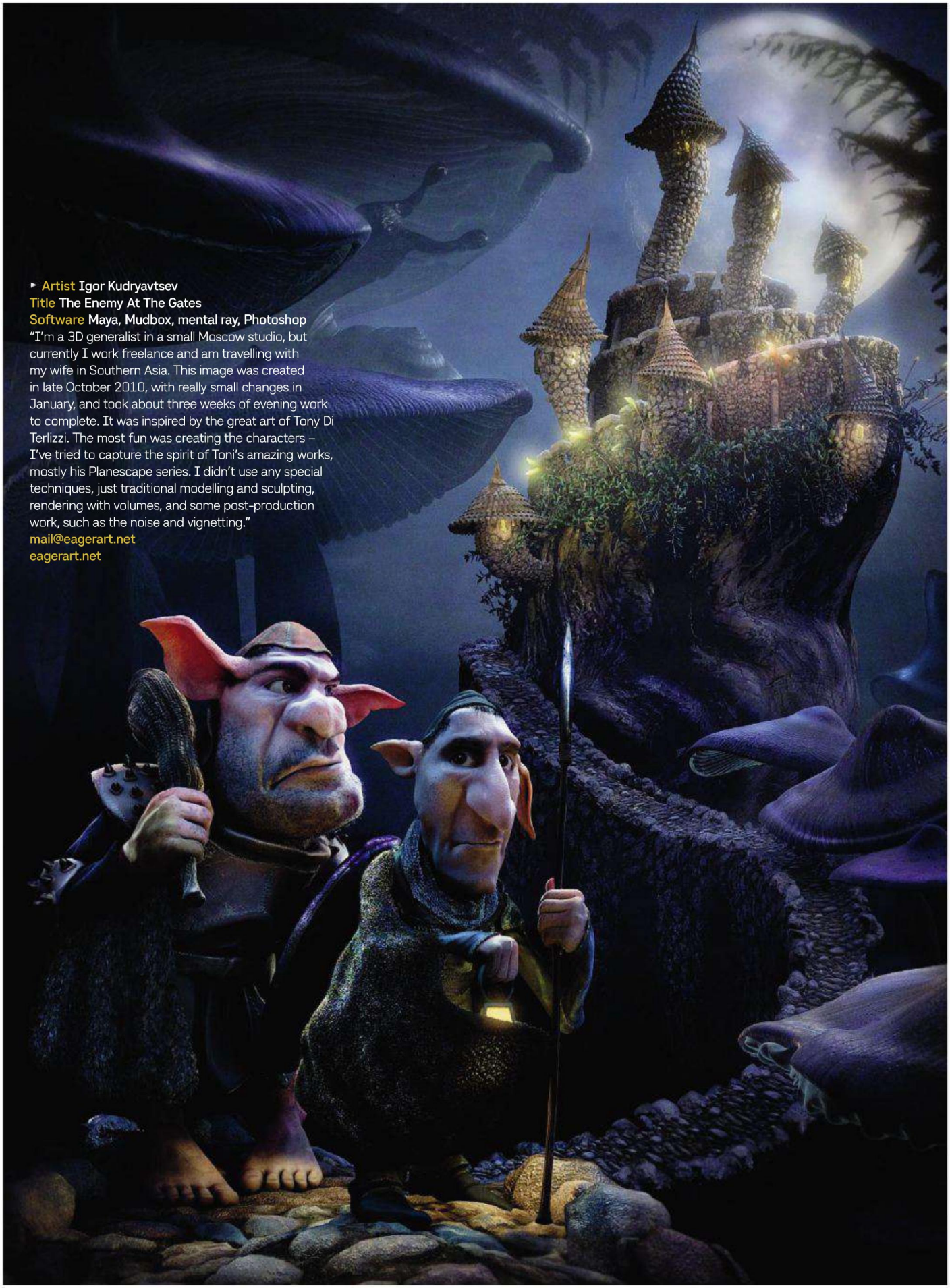
This month's selection of new 3D artwork features gritty machines, pathos, a soldier and a soul-devouring beast!



▸ Artist Petar Balsic
Title Misty Swamp
Software Maya, mental ray, Fusion
"Inspiration for this piece came from work I did many years ago. As with most of my pieces, this one is also inspired by fantasy and a cartoon style. My idea was to create a swamp controlled by some sort of magic. I wanted to create organic and lively looking trees, so I decided to go with curly shapes. I used Maya for base mesh modelling and than Mudbox for details.

"By putting in the foreground details such as trees and plants, I added more depth to the image and thus made it more interesting. The lighting and compositing part was real fun. I rendered several passes using Maya and mental ray, and then composited everything in Fusion. For the murky-looking background, I did simple painting and camera projection."
pbalsic.cgsociety.org/gallery

Petar's magical woodland scene bagged him first prize in issue 135's Chaos Group V-Ray competition



▸ Artist Igor Kudryavtsev
Title The Enemy At The Gates
Software Maya, Mudbox, mental ray, Photoshop
"I'm a 3D generalist in a small Moscow studio, but currently I work freelance and am travelling with my wife in Southern Asia. This image was created in late October 2010, with really small changes in January, and took about three weeks of evening work to complete. It was inspired by the great art of Tony Di Terlizzi. The most fun was creating the characters – I've tried to capture the spirit of Toni's amazing works, mostly his Planescape series. I didn't use any special techniques, just traditional modelling and sculpting, rendering with volumes, and some post-production work, such as the noise and vignetting."
mail@eagerart.net
eagerart.net

▲ Artist Irakli Khakhviashvili
Title Royal Enfield Continental GT 1966
Software 3ds Max, V-Ray, Photoshop
"I'm self-educated in CG, and it was about two years ago that I fell into this wonderful world. I'm currently working at a furniture factory as an operator, but freelancing in my spare time. This image took me about 10 to 14 days. I tried to make a close copy of the real bike, but I couldn't find good reference images since it's quite old, so there will be a few differences. I used a Blended Box Map for texturing from SoulburnScripts while making it, and I made plenty of improvements in Photoshop while compositing."
ika0501@gmail.com
marner.cgarena.com

Artist Alessandro Baldasseroni
Title Little Soldier
Software 3ds Max, Photoshop, ZBrush

"By trade, I'm a lead character modeller and texture artist at Blur studio. This image was done for a friend of mine, Javier Leon, who's planning to do a short film with it. The 3D model's based on a concept by Tom Gluckmann, another friend, and I enjoyed trying to match his concept as much as possible.

"It took about a month to create, more or less, and involved nothing out of the ordinary – just polygonal modelling, ZBrush sculpting and texturing in Photoshop. I finished it in January."

◂ Artist Andrius Balciunas
Title Homesick
Software 3ds Max, mental ray, ZBrush, Photoshop, Fusion
"This image was a real challenge. I took it on because I really liked the concept... There was a lot modelling involved, so it was nice when I started the texturing and shading. I used a lot of cloth simulation, as well as dynamic simulation for the chains and broken glass. Almost every shader is half procedural. I spent five months on it in my free time; I have a full-time job that isn't related to CG at all, but I do freelance."
contact@cryinghorn.com
cryinghorn.com

Artist **Pierre Bourgeout**
Title **Demon Lord**
Software **ZBrush, XSI Softimage, 3ds Max, V-Ray**

"I'm a senior character artist at United Front Games currently working on True Crime: Hong Kong. This piece was made in my spare time, and the longest time was spent experimenting with the design and rendering techniques. The sculpting itself took less than a couple of weeks. One notable brush I used was the Tilt feature in ZBrush 4.0 to create the scales.

"The aspect I most enjoyed while working on this creature was the experimentations during the design phase. I had a lot of freedom to change my design in ZBrush and I tend to sketch directly in 3D, which is the medium that comes most naturally to me."

pierrebourgeot@hotmail.com

## 3D Image of the month

Pierre Bourgeout wins a copy of Poser Pro 2010, worth $499. Linking pro production tools and ready-to-use 3D assets, Poser Pro saves development time and resources.

**smithmicro.com**

SmithMicro SOFTWARE






“The sculpting itself took less than a couple weeks. One notable brush I used was the new Tilt feature in ZBrush 4.0 to create scales”

### Get published

If you would like to see your work featured in 3D World, email us at the address below, attaching a lo-res version of the image

**portfolio@3dworldmag.com**

# Portfolio: In focus

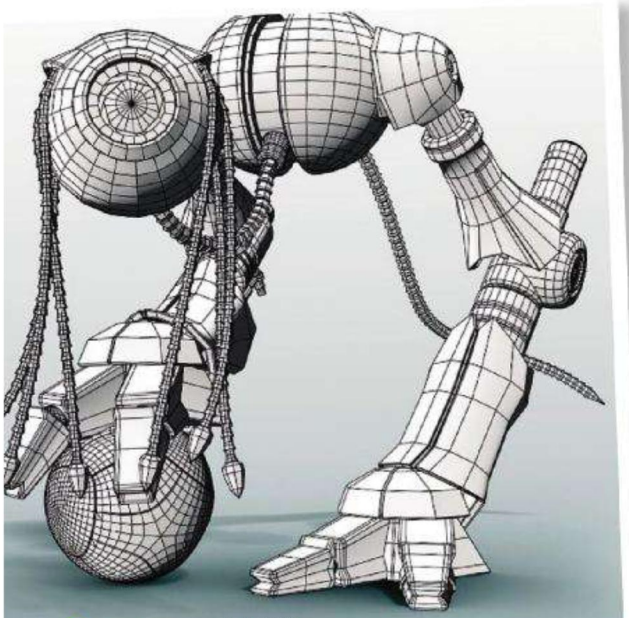
## Find out how Attila Csepy created his animation RokyR, featuring a friendly footballing 'bot

Artist Attila Csepy
Title RokyR
Software Maya, mental ray, Photoshop, After Effects, Premiere Pro

"I'm a 3D artist from Budapest, mostly working on television ads and post-production. This animation took me almost five months to make, in total, during my spare time.

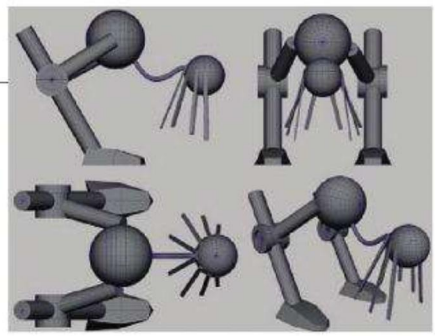
"My first idea was to create a comic cartoon robot with an all-in-one tool on its back. This tool soon changed to a ball, but everything else remained the same, including the robot's main concept, its proportions, the hair and tail."

bluedolphin-gd.com/atneworld



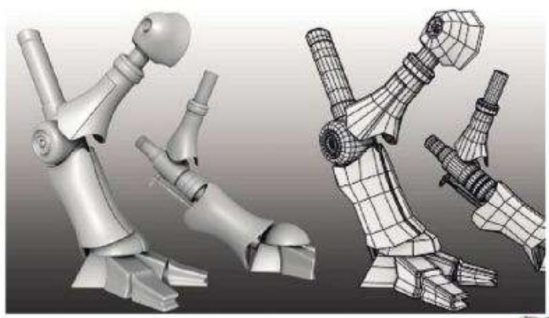
RokyR: a cross between ED-209 and GLaDOS from Valve's game Portal

## Modelling
### Basic techniques



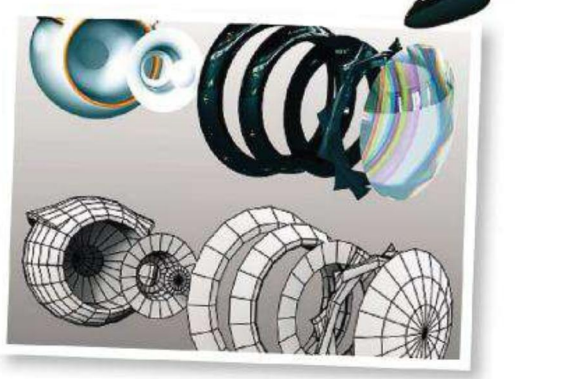
### 01 The concept and primitives

First, I made simple objects to represent the body parts, so I could easily build up the robot's body, then check the proportions, make quick changes and see it in 3D. When I'd set up the pose I had in mind, I could then start modelling.



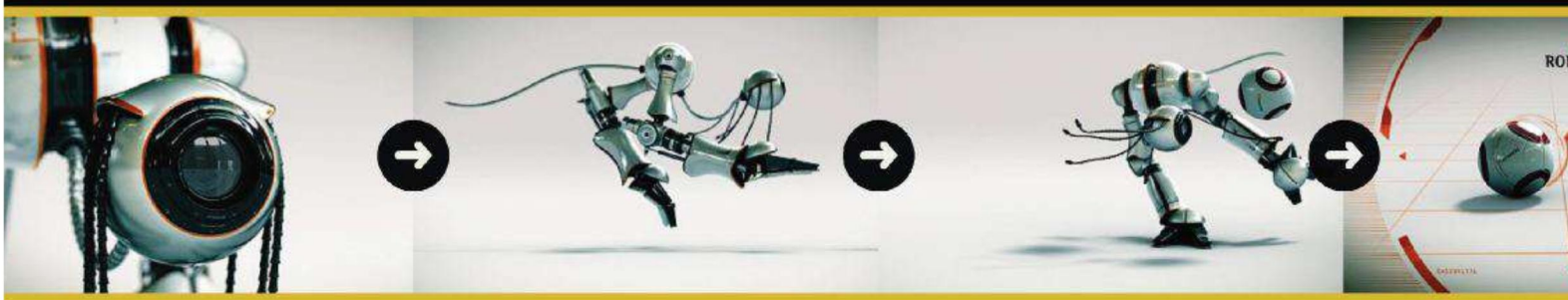
### 02 Adding the leg details

The next step was to model and detail the robot's legs and body. I'd already decided that RokyR would have a nice, clean, white shader in combination with black and metal materials, so I designed simple, modern elements. Because of the cartoon concept, I didn't add many details.



### 03 Modelling the head

The head is simply a big sphere with a lens inside. The important point was how his hair would grow from it. I came up with two or three different variations for that, so this was the last part I finished. The lens cover also adds more detail to the head. »



He's a footballing, dreads-sporting robot who wants to have fun


*Send in your work*

*Email your images to*

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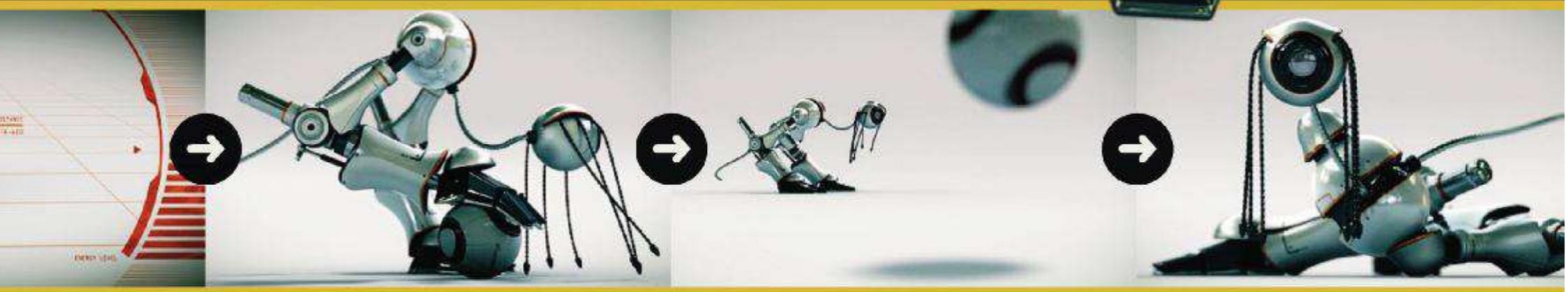
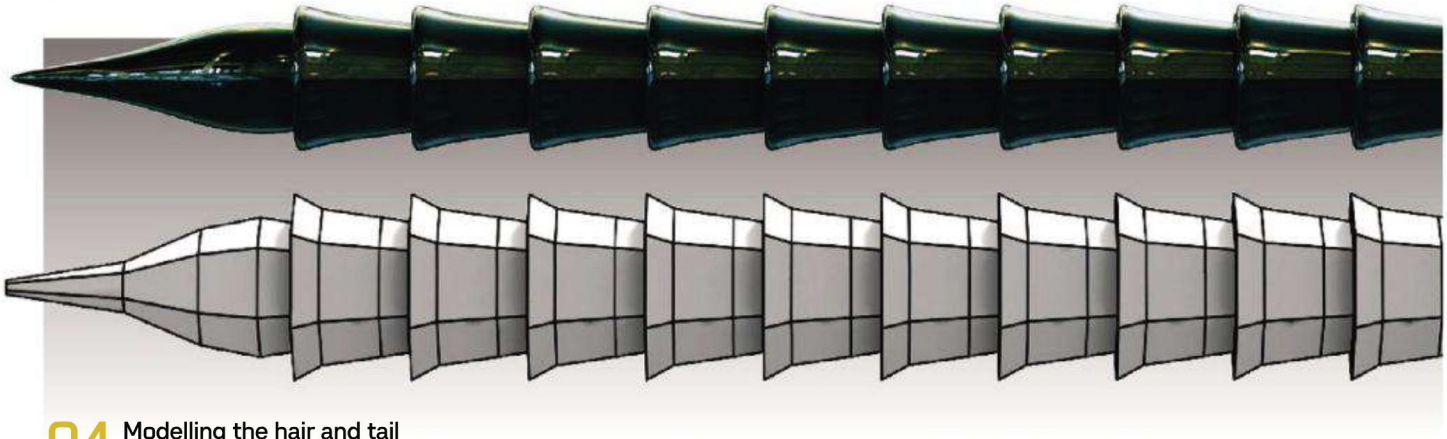
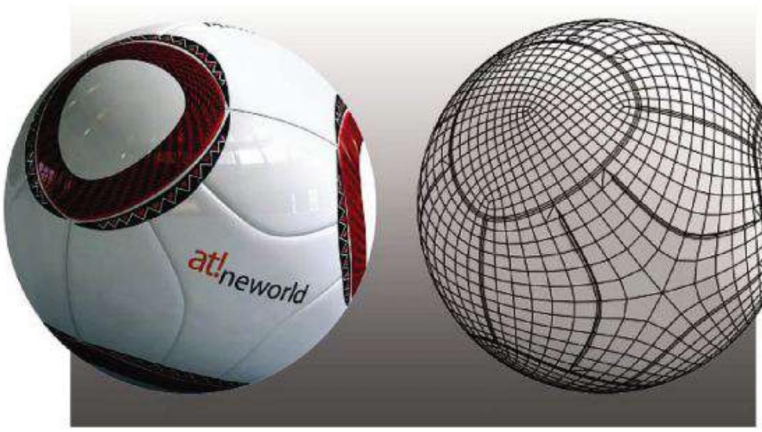
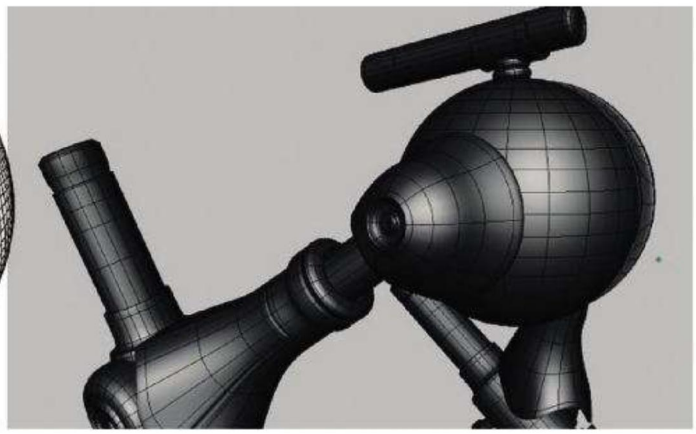




**04 Modelling the hair and tail**
The hair and tail were built up from small instanced pieces. When I was satisfied with the form of each part, I combined them into one mesh and then set them aside – basically forgetting about them – until they were required in the rigging stage.



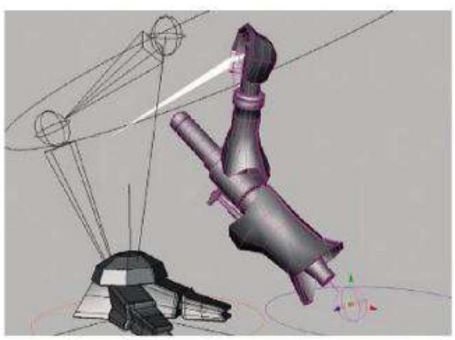



**05 Creating the ball**
This model is based on the Jabulani ball, which was the official ball of the FIFA World Cup in South Africa last year (the one that all the players were complaining about). I created a similar texture to the real thing, because I didn't want it to be overly complicated.

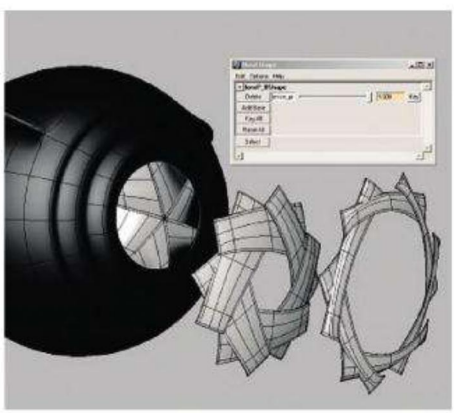
**06 The missing all-in-one tool**
This little cylinder would have been the multi-purpose tool for the cartoony robot in my original idea. It would have contained everything from a machine gun to a helicopter rotor and so on, all somehow magically contained in that small space in true cartoon fashion.

# Rigging and animation

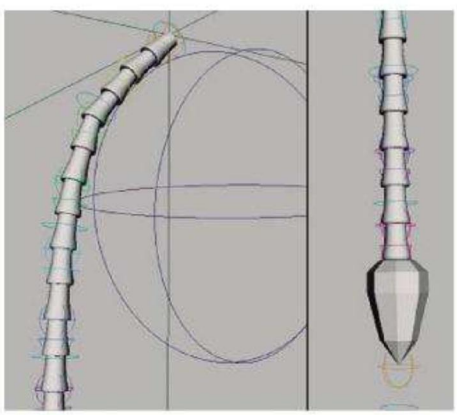
## A combination of standard techniques kept animating simple



**07 Rigging the legs**
For the legs, I used joints with an IK setup. The meshes were parented to the corresponding joints, which took care of the easy part of the rigging. For the hydraulics, I used aimConstraint, so it slid nicely on the lower leg, while the upper leg still aimed at the robot's body. For the other parts of the leg, I just used parenting and control shapes. I then locked and hid the attributes, because I didn't need them for the animation.



**08 Using blend shapes**
I found that SetDrivenKeys and blend shapes were very important for speeding up the animation process. I used them extensively for hydraulic effects, the lens cover in the head, the ball and some elements on the robot's legs, which move separately when it walks.



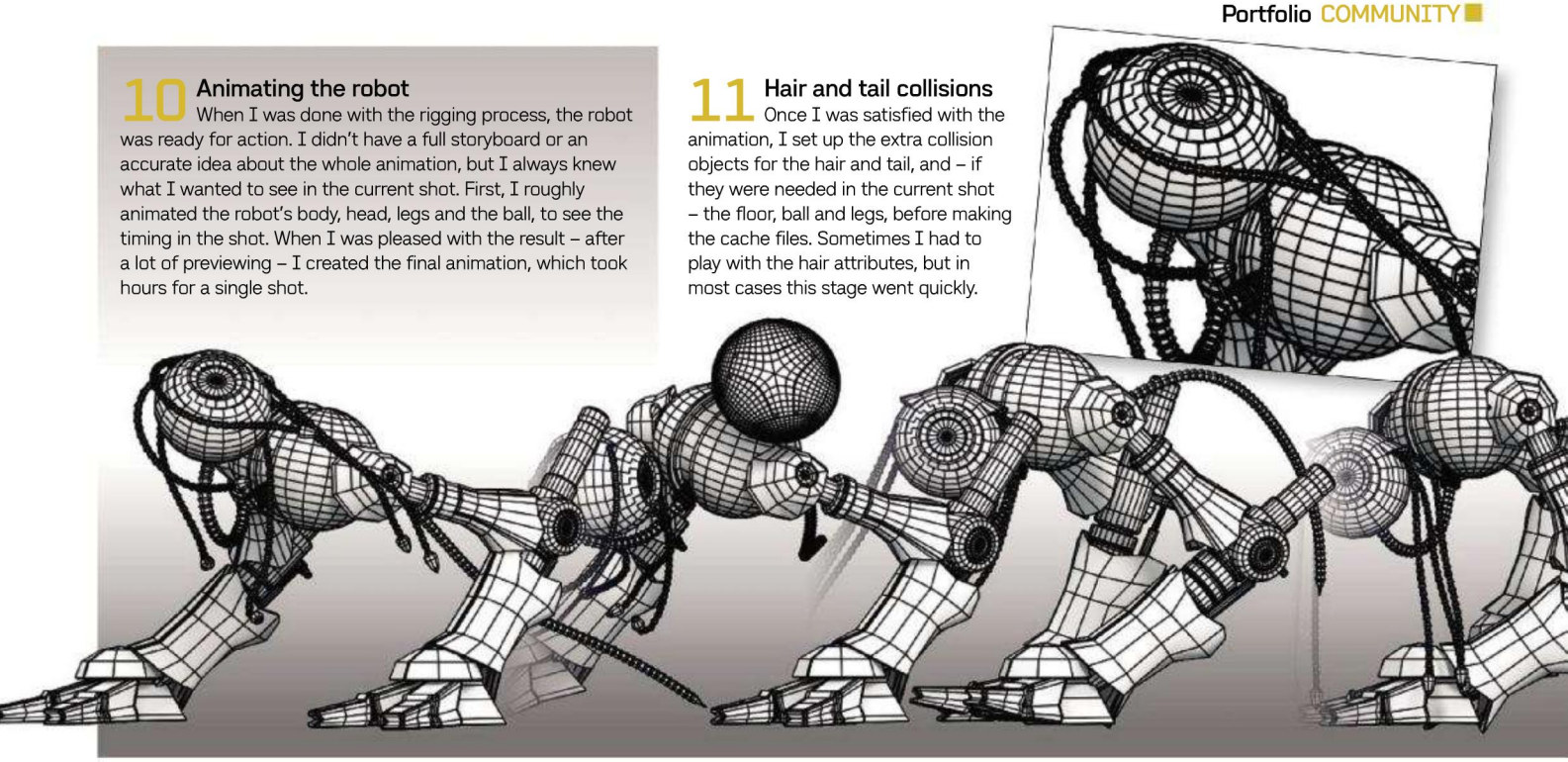
**09 Rigging the hair**
For the hair and tail, I used many joints to manage the hair mesh, which was controlled by an IKSpline. This in turn was controlled by a Hair spline. Each hair was a separate HairSystem, although I could easily change their attributes through AttributeSpreadSheet to add variety to them.

## 10 Animating the robot

When I was done with the rigging process, the robot was ready for action. I didn't have a full storyboard or an accurate idea about the whole animation, but I always knew what I wanted to see in the current shot. First, I roughly animated the robot's body, head, legs and the ball, to see the timing in the shot. When I was pleased with the result – after a lot of previewing – I created the final animation, which took hours for a single shot.

## 11 Hair and tail collisions

Once I was satisfied with the animation, I set up the extra collision objects for the hair and tail, and – if they were needed in the current shot – the floor, ball and legs, before making the cache files. Sometimes I had to play with the hair attributes, but in most cases this stage went quickly.



# Texturing, rendering and compositing

## Creating a clean, simple look for the surfaces

## 12 Texturing and shading

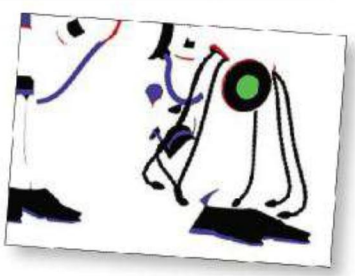
Although the robot has a clean, simple design, some elements have their own UV map with a texture. Texture resolution was mainly 2K and used mental ray's CarPaint Shader. This shader has a lot of options and gives a natural look with which I was really satisfied.

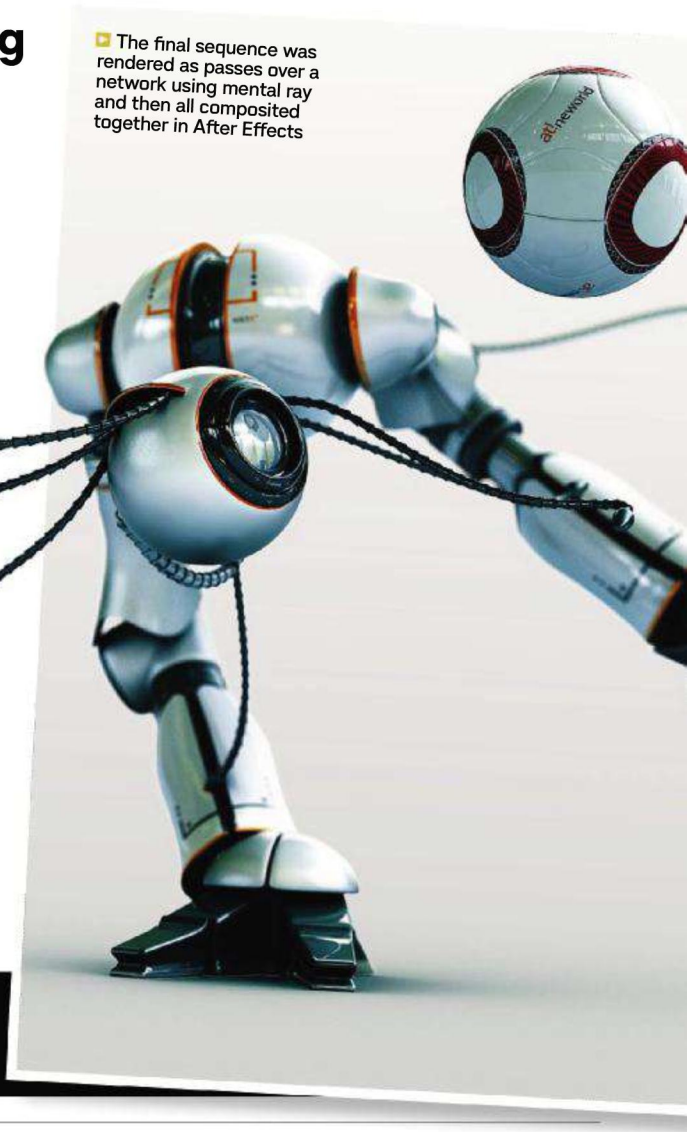
## 13 The rendering stage

When it came to the rendering for this project, I used mental ray with an HDRI image plane and one directional light. The output format was 720p, but the rendering didn't take long even with multiple render passes, because I could use network rendering. The slow-motion frames were calculated within the rendering and then rendered out of the subframes.

## 14 Final compositing

I used After Effects for compositing. Apart from the main beauty render, I used ambient occlusion for the floor, a different AO for the robot, a shadow pass, Z-depth pass, some masks, and alphas. The compositing part was easy and this was also the point when all the elements came together to form a spectacular view of my robot in action.





The final sequence was rendered as passes over a network using mental ray and then all composited together in After Effects

View Attila's animation and other examples of his work at bluedolphin-gd.com/atneworld

If you would like to see your work in our portfolio section, send your work to: ***portfolio@3dmag.com***

All geometry was created, rigged, skinned, textured, shaded and lit in Maya, while facial expressions were done using Blendshapes

**Short Cuts**
The best new animated shorts from outside the major studios

# Keep it simple

## Henrik Malmgren, director of black-and-white short The Guest, talks Andy Price through best practices when completing a solo project

In a sad but somewhat heart-warming tale, a widow named Elsa is socially deprived and stuck in her ways. One lonely evening, she celebrates the birthday of her deceased husband, only to be brutally interrupted by an intruder. Unafraid, Elsa makes a decision that will benefit both of them, and eventually – though in a slightly unorthodox manner – she finds a way to leave behind her lonely existence.

The Guest was conceived in 2004 by director Henrik Malmgren. All he wanted to do was draw and, while sat at his mother's ill-equipped computer, he started making pixel pictures. The old lady came first, followed by a policeman and a robber. "A conflict eventually emerged just by lining them up beside each other," says Malmgren. "I was interested in the clichés and wanted to play with the classic cops and robbers setup."

Malmgren then started work on the story, before deciding on a detailed 3D animation as opposed to the 2D characters set out in the pixel pictures. "I didn't have any funds or possibilities to make the film at that point, but I made an animatic. The project finally came alive in August 2006, when I was accepted to the Artist in Residence Open Workshop in Viborg, Denmark," he says.

In terms of character development, this is where The Guest's richness shines through. Malmgren notes that the writing was a much larger part of the development than any drawing back in the early stages. Once the initial personalities were outlined, they grew with development. "Even if you plan how you want them to be, they still somehow take on a life of their own once you start animating, and a lot of the personality comes out then."

### Adding character

During the initial plot setting, Elsa's goal as a character is hinted upon – cooking dinner for two, despite being alone in a vast, old house. The shot of two pork chops in the pan is a little heartbreaking, despite being part of an opening scene, and is testament to Malmgren's ability to create believable and relatable characters. "I was inspired by my parents' and grandmothers' homes – their collection of things brought together over time. It tells the story of their lives."

It's this new-found devotion to design, which came after the character creation, that adds a second level of appreciable value to The Guest. "I was always impressed by the dedication to design you can find in the Wallace and Gromit films – their fine sense of storytelling through design interests me," says Malmgren. "For The Guest, I was trying to put things into the film that would look non-designed, but have charm. I took pictures of Copenhagen and Viborg, where I lived – which were consumed by grit, grime, dirt and wear and tear – to achieve this."

When it came to pulling all these elements together, Malmgren lucked out: not only had the film been entirely mapped out by the time he reached the Open Workshop, but housing, software and 24-7 equipment were provided. The pipeline, however, remained a relatively straightforward mix of Maya, Photoshop and Fusion, though he did use a number of additional scripts and tools. "Since I was new to advanced rigging, I didn't feel I had time to create rigs for seven characters, so I used The Setup Machine. I had to do a lot of tweaking, but it was a great

**VITAL STATISTICS**
Title The Guest
Duration 7:16
Directors Henrik Malmgren
Budget Undisclosed
Production time 2.5 years
Software Maya, Fusion, Photoshop
Synopsis In a socially deprived society, a widow makes a life-changing decision after her house is broken into
If you like this, watch... Jojo in the Stars, Marc Craste, 2003
Website theguestfilm.com

### KEY TECHNOLOGY

Despite employing the ethos of keeping things simple, director Henrik Malmgren found that there were one or two visual elements that caused a little tension and needed to be solved. One of these was the blinking red lights of the police cars – the only colour in the otherwise black-and-white film. "I wanted to be able to alter the speed of the blinking in compositing, or to completely remove it if it was too irritating," says the director. "I developed the look on top of a final render in Photoshop, working with mock passes, but I had trouble with integrating red light so it would look convincing. I wanted a simple solution that didn't look flat and generic."

To achieve this, Malmgren used a combination of masks created in Photoshop and a simple render pass with a constant red light (rendered white on black) to get close enough to the sketch while compositing in Fusion. The blinking was achieved by simply keyframing the transparency.

**The lighting was made with as few light sources as possible to reduce the render time, which also made creative choices easier: the lights were put where the light sources were and extra lights were only added for clarity**

help – I ended up being able to spend less time on tech and more on filmmaking."

Creating a seven-minute, full-CG animation on your own is no mean feat, though Malmgren remains modest, noting that he just kept things straightforward and disciplined. "There are no crazy camera moves, no fancy new shading solutions or weird render passes, no stretchy Spline IKs and Ribbon Setups, and so on," he says. "I wanted to use off-the-shelf technology as much as possible, squeezing the most out of the Blinn and basic lighting techniques, asking people for simple solutions and then implementing them simply. I worked with the older versions of the software to be sure everything worked, staying maybe one version below my peers. This approach kept me free from most technical problems. As I'd chosen to be 'the lonely generalist', I just couldn't be bothered with impressive solutions – if it looked good, it was good."

It's thanks to this approach that Malmgren ended up with the unique experience of The Guest. There's tension and suspense among the brooding characters and drab visuals. Malmgren covers all the bases necessary in the showcase of the short film. By keeping it simple, he allows the story and subtle direction to take over and create the soul of the film. "I want to animate so that the audience doesn't see the animation," says Malmgren. "Instead, I want them to get caught by the narrative and sense the characters' personalities."

### WATCH THE ANIMATION

**You can view The Guest in the Animations section of our website**
tinyurl.com/shortcuts140


Malmgren's short film started life as simple pixel pictures of three characters

### Send us your shorts

To submit work for inclusion in Short Cuts, contact us at the address below, attaching a brief synopsis and at least three stills
**enquiries@3dworldmag.com**

# Inbox

We are now on Twitter. Follow us at twitter.com/3dworldmag

This month, you gave us a handy 3D-Coat tip, considered cheap tracking and suggested an online future for our cover discs. Send your own feedback to **inbox@3dworldmag.com**

PFHoe is an example of a cheap but usable tracker. The Pro version simply offers more export options

## TRACKY BUSINESS

As a recent graduate from a computer graphics course, I believe I'm actually seeing the world with both eyes open! Our course introduced us to many things, but we briefly touched on using 3D camera tracking software such as PF Track (although I'm aware that there are a couple of other high-end packages available – namely Boujou and SynthEyes).

I've developed a neat little showreel and have begun fine-tuning it for different effects houses, but I really want to integrate my work into moving footage using camera track data. The only problem is that I no longer have access to the HD cameras that the university offered, and I'm afraid the guys from Boujou would kick down the door the second I completed a risky download of their software.

Are there any websites or companies that might provide a couple of high-quality videos and already tracked camera track data so that the general public can begin to experiment with this kind of stuff? Maybe you could link up with a couple of companies to offer some of this on your free disc?

*Lee Done, Cheshire*

There are less expensive camera trackers on the market, such as the University of Hannover's Voodoo – which is free – and The Pixel Farm's PFHoe, which is £49 (£99 for the Pro version with extended compositor support). And you don't need a full HD camcorder to experiment; a lot of compact digital cameras and SLRs can shoot HD (or 720p) video, which should be fine for some clips to go on your showreel. Alternatively, some time on Google might reap some useful results.

### Get published

Email us your feedback on the magazine or the state of the 3D industry in general at the address below, including the country in which you live. The sender of the best letter each issue receives a prize
**inbox@3dworldmag.com**

3D-Coat can handle detailed models like this lizard perfectly

## GET YOUR 3D-COAT

I just read your review on 3D-Coat and I liked it a lot. I do have a minor correction, though. You suggested that there's only one level of subdivision. While it's true that you can only go back and forth between two levels, you can actually choose how far down the levels you're going. In the Voxel menu, under Proxy Visualization, you can choose if you want to subdivide by 2x, 4x or 8x. This is actually better than working with a polygonal sculpture because you can start at any resolution you want, not just a low res – and that's great for working with very high-res scan data. Hopefully this can improve your 3D-Coat experience.

*Phil Nolan, via email*

## DEUS EX MACHINIMA

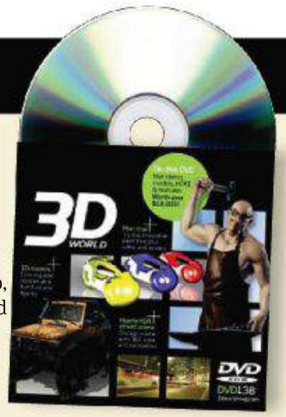
I'm a new reader of your magazine and I'm surprised how awesome it is. I'd like to say thank you for providing those mocap files – they proved to be very useful in the machinima I've been working on. Also, I'm waiting for my licence for a new program that I've purchased, named iPi Soft that enables you to motion capture from your webcam. I think you should review it because now people can do mocap from their bedrooms.

*Cihan Solbudak, via email*

Already did – Craig Crane gave it a good recommendation in issue 136. And you can still win a copy for yourself if you hurry over to ipisoft.com/3dwcomp. ■

Mocap tools are becoming more available to amateurs

# Letter of the month




## DISCONTENT

I'd like to offer some thoughts regarding the DVD. I find it invaluable, but the content that I use may be less than 10 percent of all that's offered on the DVD. I never really need the rest. Some time ago, I realised that just having the DVDs stored was of little use when I wanted to find something. I decided to copy everything to hard drives and catalogue all the files by theme, keyword, and so on. But this was too much work and I stopped doing it. I know of the Excel file that's available to do searches, and that's a big help. However, it still means I need to receive and store the DVDs, do a search on the Excel file, locate the DVD, uncompress the file and save it.

I'd find it much more useful if instead of receiving the DVD, each issue listed the files that would have been included on a DVD in that month. If I needed something, I'd do a search on a database. Registered subscribers would have access to a protected section of the website and they could download content from the issues they subscribed to. This would accomplish a few things:

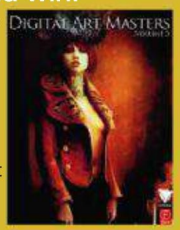
- DVD creation and shipping costs would almost disappear, being replaced by the cost of electronically storing and transmitting files
- Finding files would be a lot easier than it is now
- Subscribers would always have access to what they need, without having to store other things that may never be used
- Only registered subscribers could access the files, limiting the potential for illegal downloads – perhaps even making it more difficult for pirates to upload the whole DVDs to torrent sites.

*Juan Carlos Gonzalez-Najera, Burlington, NJ, USA*

Interesting idea – and we might well end up doing something like this. But at the moment we're limited by the amount of server space allocated to us by our parent company, so we're not currently in a position to host all of the disc and training content. Of course, as we stride boldly into a digital future – you can now buy 3D World as a Zinio edition – this is an area we'll have to look at.

### Write in and win!

Juan Carlos wins a copy of Digital Art Masters 5, a sumptuous in-depth look at the work of some of the best in the industry **3dtotal.com**




3D WORLD *Creative Challenge WINNER*

Congrats to T3chn0h1ppy for his winning space whales image. If you think you can do better, prove it at **forum.3dworldmg.com**

## 3D World forum

Go online to talk about the hottest 3D trends and share tips. There's a Creative Challenge every month for you to flex your 3D muscles on, too **forum.3dworldmg.com**

Full-body shoots are still required because the actor's body and neck movements are captured separately

# The future of facial capture?

## Showcased on hotly tipped videogame title LA Noire, the MotionScan system from Depth Analysis promises detailed facial capture with no manual clean-up


Depth Analysis' MotionScan capture system is behind the detailed facial animation in Rockstar Games' LA Noire, a crime title set in the 1940s and set for release on PlayStation 3 and Xbox 360.

The concept of facial motion capture isn't a new one. Ever since Robert Zemeckis' The Polar Express steamed onto cinema screens in 2004, many of Hollywood's highest-profile movies have been entirely performance captured. Even its application to real-time projects isn't new, with recent games from Enslaved to Red Dead Redemption making extensive use of facial capture. But the idea of capturing usable facial data in real time, with no manual clean-up... now that's something novel.

Let's qualify that last statement a little. MotionScan, the facial-capture system used on Rockstar Games' upcoming PlayStation 3 and Xbox 360 title LA Noire, isn't literally a real-time technology. But at 15-20 minutes of processed animation data per day – and that's data ready for use in the game engine, not raw data prior to cleaning – its throughput is well within the limits claimed for 'real-time' rendering systems.

Equally importantly, MotionScan is markerless, requires no special make-up and is based solely on off-the-shelf hardware. With the technology now being marketed to studios worldwide in fields from VFX to forensic animation, we spoke to Depth Analysis, the company responsible, to assess what MotionScan brings to the industry.

But first, some history. Brendan McNamara, founder of LA Noire developer Team Bondi, is no stranger to large projects. His previous game, PS2 crime series The Getaway, called for the recreation of 25 square miles of central London. For his new project, the key challenge wasn't the environments, but the characters – and he quickly became aware that existing facial-capture technology wasn't up to the job.

"From the very early stages, Brendan had decided that the script was going to be big," says Depth Analysis' head of research, Oliver Bao, who began work on the project in April 2004. "Originally, we estimated that 2,000 separate characters would need to be scanned. So from day one, we decided the process should be automatic." Although the cast eventually dropped to a slightly more manageable 400 actors, LA Noire still clocks in at over 2,000 pages of script. The resulting 55 hours of audio footage, 25-30 of which appear in-game, dwarfs even films such as The Polar Express and Beowulf.

Moreover, the facial capture had to be accurate. LA Noire places the player in the shoes of 1940s LAPD detective Cole Phelps. As he navigates through a seedy underworld of vice and corruption, it falls to the player to uncover the motivations of the people Phelps encounters. Put bluntly, the animation has to be good enough for you to tell when a character is lying.

### The MotionScan process

Before facial capture can begin, each actor goes through hair and make-up. Unlike Mova's Contour system, which uses UV-reflective make-up as an intrinsic part of the capture process, MotionScan simply requires an actor to be made up to reduce the shininess of their skin, avoiding unwanted specular highlights.

For LA Noire, hair geometry was captured along with that of the actors' faces: a process


LA Noire places the player in the role of Cole Phelps. Phelps, and the 400-odd characters he encounters, provide believable performances captured by the MotionScan system

A single operator oversees the capture session. The MotionScan procedure is specifically designed to avoid manual clean-up

facilitated by the slicked-back styles of the period. While it can take up to three hours to marshal long hair into a style compact enough to scan, in most cases it takes only 30-60 minutes.

Once made up, an actor moves to the capture stage: a brightly lit white space Bao describes as "like being in 2001: A Space Odyssey". The room is soundproofed to enable Depth Analysis to record audio at the same time as facial performance, so their only contact with the outside world is through a monitor displaying the script, storyboards and a live feed of the director or the character they're acting against.

Since the capture volume is relatively small (actors can turn their heads 45° left and right and 20-30° up and down), the actor remains seated at all times. The in-game characters' body and neck movements come from separate full-body shoots.

The 32 cameras trained on the actor's head are arranged in pairs, enabling the MotionScan system to recreate facial geometry through stereo-matching techniques. "We have [that many] cameras because we need to cover the entire head, from underneath to the back," says Bao. "Each has 50 per cent overlap with its neighbours, so if one of the pairs fails, we have built-in redundancy."

In all, around 30 separate operations are required to generate final textured geometry from the live image streams. First, stereo image pairs are compared to obtain disparity maps. These are then used to generate surface patches in point cloud space. Patches are merged to generate the entire head, then a mesh is fitted to the point-cloud data. Noise is clipped away and the entire data series subjected to temporal filtering to stabilise the surface, then the video textures projected onto the geometry.

## No clean-up required

It takes around 10 minutes to generate a 'neutral head' that the director can use to check the 3D output. Typically, the only input required is the selection of a ready-made template designed to take account of the actor's facial proportions. "For an overweight character, you need to allow more volume for the neck region, for example," says Bao. The animated facial geometry can then be exported to an application such as Maya or MotionBuilder in FBX format, or in the proprietary format required by LA Noire's game engine – a compression process that reduces the data rate from 1GB/s to 100kB/s.

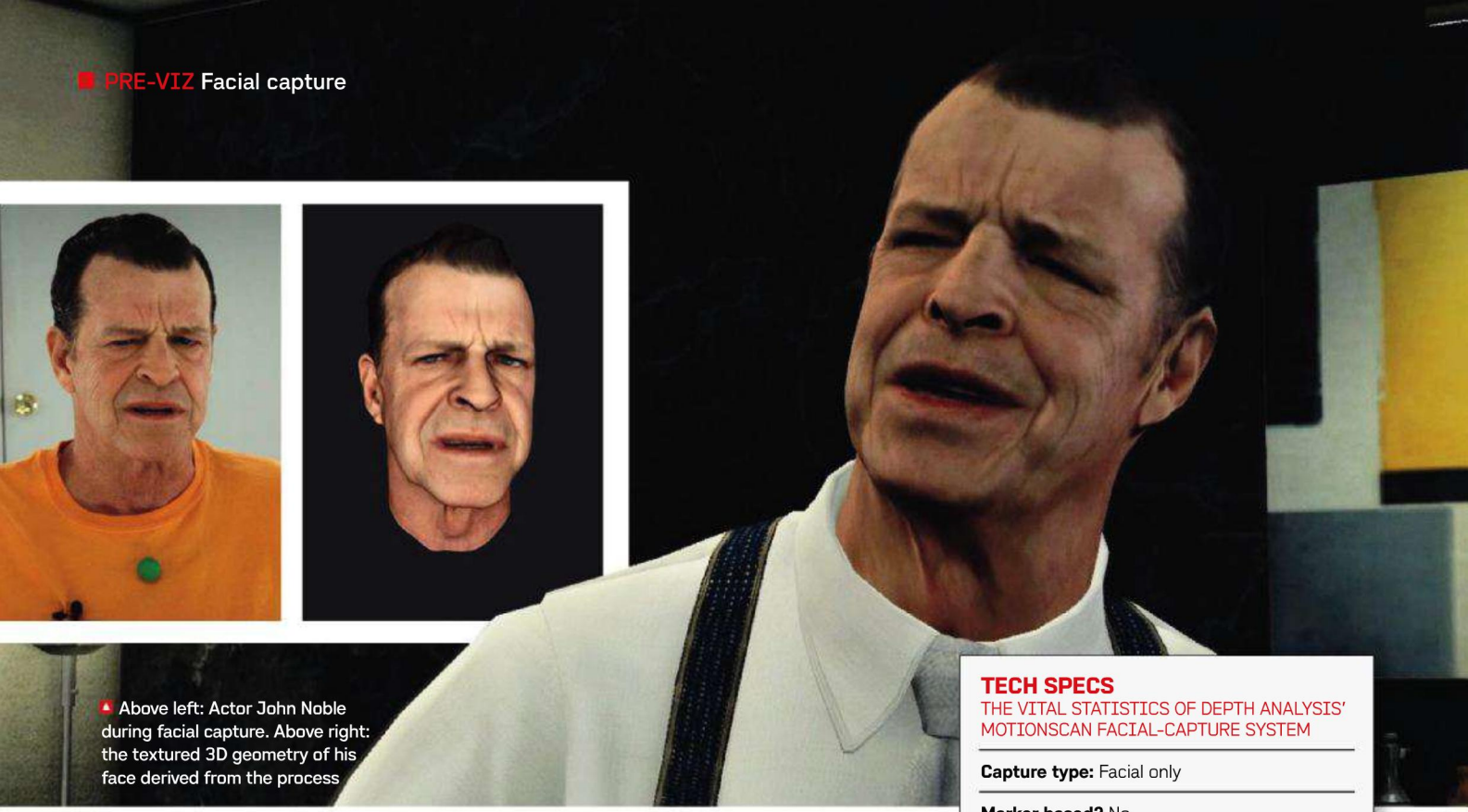
Facial animation isn't linked to an underlying rig. "There's no control point to adjust, say, the eyebrow," explains Bao. "We allow [Team Bondi's artists] to touch the textures – the specular maps, the shader look-up maps, those kinds of things – but other than that, they can pretty much just attach props like glasses or more hair."

*"We didn't want animators touching up the data. Each time you do that, you lose a bit of the personality. We wanted LA Noire to be as authentic as possible"*
*Oliver Bao, head of research, Depth Analysis*

Aaron Staton on the MotionScan stage. The orange shirt that he's wearing minimises colour spill onto the actor's face, avoiding the need for the footage to be cleaned up manually

This policy of 'run as recorded' is a deliberate decision on Depth Analysis's part. "We didn't want the animators touching up the data," says Bao. "People tend to use their own faces as reference, and every time you do that, you lose a little bit of the [original actor's] personality. We wanted LA Noire to be as authentic as possible."

Equally importantly, eliminating the need for manual data clean-up increases throughput. "We can generate 15 minutes of animation a day. An animator could spend a whole week »



Above left: Actor John Noble during facial capture. Above right: the textured 3D geometry of his face derived from the process

just touching that up," says Bao. "[To adjust the output], it's quicker just to capture different versions of a performance and mix the takes."

So how does MotionScan compare to other facial-capture technologies on the market? While the raw resolution of 1-3mm is lower than that of Vicon's marker-based or Mova's make-up-based systems, both of which claim sub-millimetre accuracy, the in-game footage from LA Noire suggests that it's more than adequate for the job.

"Whereas actors are traditionally told to 'go bigger' so the markers can be read easily, we tell them to be as natural as they can," says Bao. "Sometimes we've had complaints from the QA people that the facial performance needs to be [made less subtle] to make gameplay easier!"

While the need for the actor to remain seated on the capture stage is restrictive, the lack of manual clean-up more than offsets the time required for a separate full-body shoot. Bao is currently working on increasing the capture resolution of the system and extending the same techniques to full-body capture. While he admits that the latter – given the issues posed by self-occlusion and motion blur – is "a totally different ball game", he envisages that this shouldn't take as long as the development of the original MotionScan prototype.

Depth Analysis also aims to expand its capture facilities from a single studio in Culver City, California, to a set of satellite stations around the world, and is in talks with as-yet-undisclosed potential clients in sectors ranging from visual effects to medical and forensic animation. Based on their feedback, Bao is working on adding retargeting capabilities to the system, to enable studios to transfer capture data to a character with different facial proportions.

For most people, however, the first proof of MotionScan's efficacy will come with the release of LA Noire, scheduled for spring this year. Early demos of the game technology at E3 last year generated a wave of excited press coverage, with Official PlayStation Magazine editor-in-chief Tim Clark declaring that the facial animation "blew him away" – an experience Bao claims is common among beta testers. "Gamers usually stop talking entirely," he says. "But they can't keep their mouths closed, either. They just sit there staring at the screen in shock. With the more studio-type people, you can see them thinking, 'How much is this going to cost me?'"

Bao himself admits to a mixture of excitement and relief to be coming to the end of a seven-year journey, including 80 full days of capture sessions. So will he play LA Noire on its release? "Probably not on launch day one," he laughs. "I've seen too much of it already. But I can't wait to hear what audiences think of it."

### TECH SPECS
THE VITAL STATISTICS OF DEPTH ANALYSIS' MOTIONSCAN FACIAL-CAPTURE SYSTEM

**Capture type:** Facial only

**Marker based?** No

**Make-up required?** Standard theatrical make-up only

**System specifications:** 32 x 2-megapixel off-the-shelf machine vision cameras
**Capture rate:** 30fps
**Data rate (raw footage):** 1GB/s

**Maximum daily capture (raw footage):** 50 minutes
**Maximum daily capture (processed data):** 20 minutes

**Export formats:** FBX, proprietary formats
**Data rate (in-game):** 30-100kB/s

*"During facial capture, actors are traditionally told to 'go bigger' so the markers can be read easily. We tell them to be as natural as they can"*
*Oliver Bao, head of research, Depth Analysis*

The plot of detective title LA Noire requires facial capture that's accurate enough for the player to notice when characters are lying to them. Would you trust this suspect?

The men behind MotionScan: Oliver Bao (left), head of research at technology company Depth Analysis, and Brendan McNamara (right), founder of game developer Team Bondi

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# The Filter

Our pick of the past month's 3D software and training resources, ruthlessly stripped of PR hyperbole. Visit **3dworldmag.com** for more product stories and all the breaking news


## *Marvelous Designer 2.7*

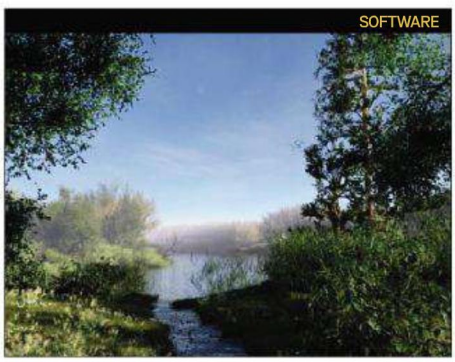
DEVELOPER: CLO Virtual Fashion Inc
WHAT IS IT? Software for creation of 3D clothing
WHAT'S NEW?
- Design accurate 2D clothing patterns with 3D modifications updating in real time
- Multi-core support for rapid draping speeds
- Cloth effects such as tuck, pleat, gather line
- Imports COLLADA and OBJ files

THEY SAY: "You can design accurate patterns using Marvelous Designer without the help of other pattern CADs. It provides support for polyline, free curve and dart drawing. With only a few clicks of the mouse, you can sew any patterns in any styles"
WE SAY: An interesting piece of software at an affordable price. Although made with clothing designers in mind, anyone in the business of character creation should take a serious look at this
PRICE: $99 (personal), $699 (small business), $1399 (Enterprise)
MORE ONLINE: **marvelousdesigner.com**


## *IKinema for Maya*

DEVELOPER: IKinema
WHAT IS IT? A dynamic Maya plug-in to aid in easy animation of any multi-limbed character
MAIN FEATURES
- Full-body animation of any character or creature
- Save time by working directly on your model
- Automatically accounts for gravity and balance to produce fluid, lifelike movement

THEY SAY: "Animate in seconds any creature and any model over the full-body. Retarget from any source to any target in seconds. Apply forces and automatic balance for realistic behaviour. Customise instantly your animation and motion capture data. Stream and retarget in real time from Vicon Blade"
WE SAY: IKinema for Maya enables you to do a lot of the retargeting and editing that MotionBuilder does, but directly in Maya and for a fraction of the price
PRICE: $495
MORE ONLINE: **ikinema.com**




## *GrowFX 1.5*

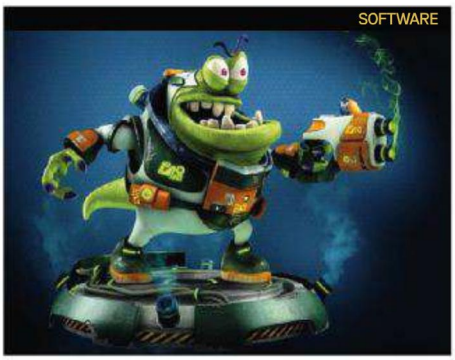
DEVELOPER: Exlevel
WHAT IS IT? 3ds Max tree and plant creation plug-in
WHAT'S NEW?
- Meta mesh technology enables models to look and behave extremely realistically
- Create more optimised plant models
- Convert GrowFX objects into editable splines
- Extended UVW mapping control

THEY SAY: "GrowFX lets you create broadleaf trees, conifers, palm trees, flowers, ivy and many other vegetation compositions. Its unique model-building tools will help you create creeping plants, entwining scene objects and shearing plants of any shape"
WE SAY: GrowFX seems relatively simple to use and yields good, realistic results. The new Meta mesh feature produces trees with no visible joins between trunk and limbs, which is a major benefit
PRICE: $260 (free upgrade)
MORE ONLINE: **exlevel.com**


## *Maxwell Render 2.5*

DEVELOPER: Next Limit Technologies
WHAT IS IT? Unbiased rendering engine
WHAT'S NEW?
- Improved technology for CPU-based Fire (Fast Interactive Rendering) system
- Enhanced performance with subsurface scattering
- Supports all Maxwell Render features and materials
- Updated scripting and network support

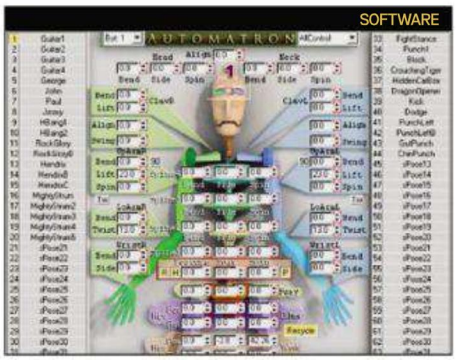
THEY SAY: "We are pleased to announce this new release, which includes many new and exciting features. Maxwell Fire is an interactive tool that provides instant results while setting up a scene and can preview scene lighting and materials in seconds"
WE SAY: The most impressive feature of this release is how quickly the interactive render updates. Its simple interface and enhanced technology make this a very welcome update
PRICE: $995 (free upgrade)
MORE ONLINE: **nextlimit.com**




## FurryBall 2.0 GPU renderer

DEVELOPER: Art & Animation Studio Ltd
WHAT IS IT? Maya plug-in combining interactive viewports and quality renders
WHAT'S NEW?
- Uses the latest GPU technology to provide final production-quality rendering and interactivity
- Full integration with Maya for an efficient workflow
- Renders in real time with support for fluid dynamics (fire effects) and depth-of-field
- Texture-based ambient lighting for HDR-like results

THEY SAY: "FurryBall is the first unique real-time GPU renderer in production quality implemented directly into Maya. No more time-consuming exports, waiting and tuning in new applications"
WE SAY: FurryBall looks to make long render times a thing of the past. With claims it operates between 30 and 300 times faster than CPU renderers, this is one Maya plug-in worth investigating
PRICE: $299 (Light), $699 (Design), $999 (Master)
MORE ONLINE: **furryball.aaa-studio.eu**




## Automatron

DEVELOPER: Andy Murdock
WHAT IS IT? Powerful character animation tool designed for use in 3ds Max 8 and above
MAIN FEATURES
- Includes time-saving tools, such as a procedural walking system and crowd simulation
- Features to aid key framing and rig customisation
- Includes an advanced IK blending system

HE SAYS: "Automatron was made to solve many of the frustrations that I encounter when doing character animation. Hunting around the scene can eat up a huge amount of energy. That wasted time had to be spent elsewhere, making animation"
WE SAY: Despite the somewhat daunting UI, this free plug-in is a dream come true for serious animators. Covering everything from walk cycles to crowd simulation, this dynamic tool should prove to be a serious time saver
PRICE: Free
MORE ONLINE: **tinyurl.com/49asldb**


## Ruins 3.5

DEVELOPER: nShatter
WHAT IS IT? Update of the dynamic shatter plug-in for Maya
WHAT'S NEW?
- Features wind, magnet and curve fields
- Supports both CUDA architecture and Bullet physics engine acceleration
- Free upgrade from Ruins 3.0

THEY SAY: "Ruins is a shatter plug-in for Maya that provides very quick and precise shattering. It features a new UI and can use fields to drive the rigid body movement"
WE SAY: For seasoned users of Ruins, the latest version offers great additions as a free upgrade. New users may find it a bit pricey, but if you want to demolish objects in Maya – and do it at speed – this is the way to go
PRICE: $299 (free upgrade)
MORE ONLINE: **nshatter.com**


## Luxfolio Stereoscopic Portfolio

DEVELOPER: Luxology LLC
WHAT IS IT? iPad app for viewing stereo images
MAIN FEATURES
- Displays stereo-ready and standard images with a stereoscopic effect
- Three viewing options (anaglyph, two-up, wobble)
- Fully supports iPad functionality, including slideshows, plus pan and zoom using gestures

THEY SAY: "This app lets customers of modo and other 3D software packages view their stereo assets on the go. We're just beginning to tap into the image presentation and processing capabilities of the iPad and look forward to presenting customers with new and exciting options in the future"
WE SAY: We see a lot of artists using the iPad to showcase their work on the go, and this provides a neat way of presenting stereoscopic footage
PRICE: $2.99 (available from the Apple App Store)
MORE ONLINE: **luxology.com**

▲ Master the art of UV maps and realistic texture painting with Maxon's BodyPaint and a little help from Gnomon MD, Eric Miller

# Training product of the month

## Introduction to Maxon BodyPaint 3D with Eric Miller

PUBLISHER: Gnomon Workshop
Learn how to use one of the best painting tools used in the industry today, BodyPaint, with the final training DVD of 2010 from The Gnomon Workshop. Managing director Eric Miller provides over eight hours of lectures with everything you need to get started beginning with the fundamentals of navigation, document setup and UI. The extensive training progresses to more advanced techniques including Maya and Photoshop integration, painting models, and using custom brushes.
PRICE: $69
MORE ONLINE: **tinyurl.com/37jb3f5**

Jerusalem 2111
The International Animation Competition

# Award winners

**Late last year, a challenge was made: imagine Jerusalem's near future in video form. Here's who rose to the task...**

1st PLACE

## David Gidali

Title: **Secular Quarter #3**
Contact: **david.gidali@gmail.com**

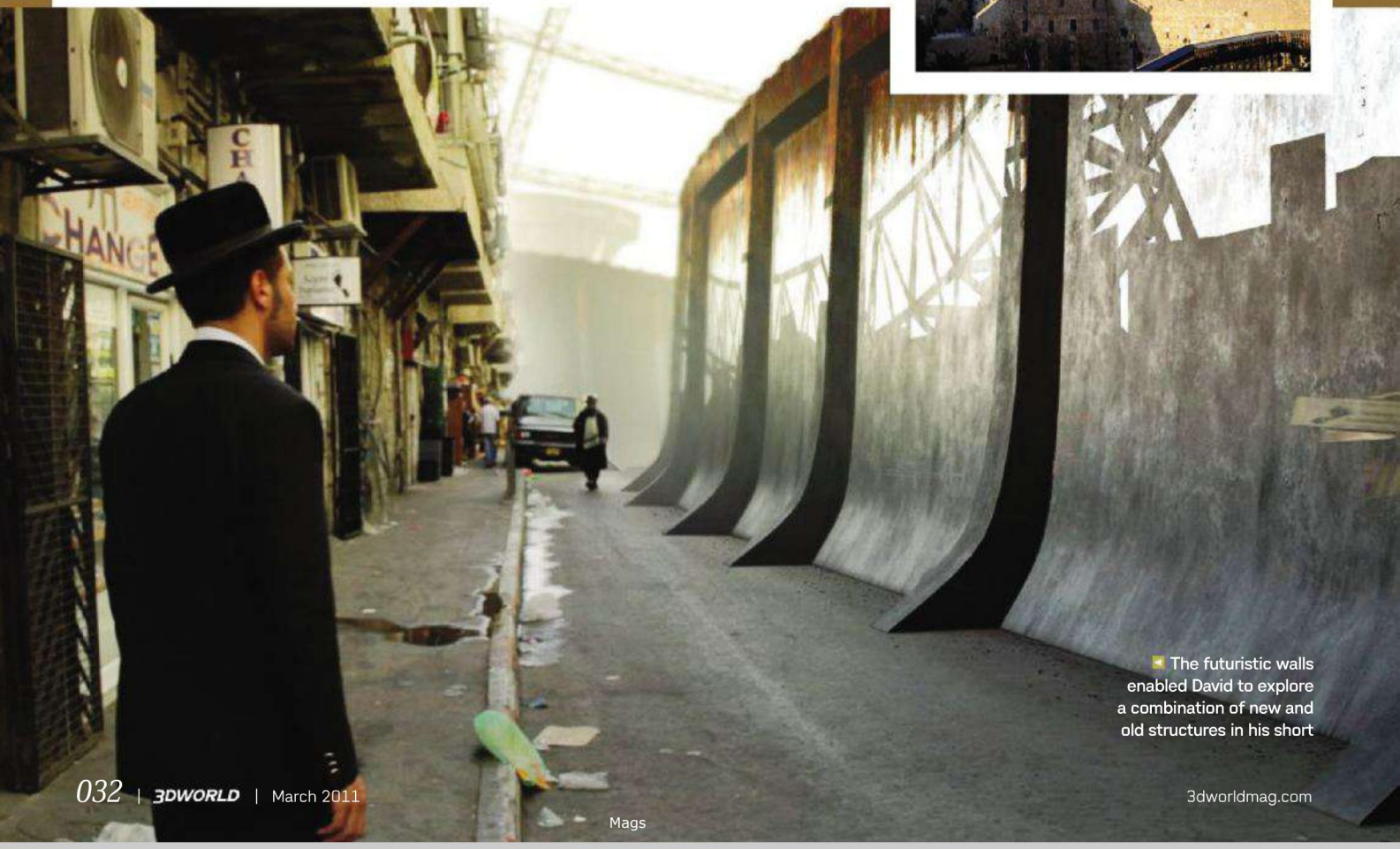
"The brief was to create a futuristic vision of Jerusalem, a city in the centre of a worldwide cross-cultural dispute. The first thought that came to mind was: 'Will Jerusalem at all exist in a hundred years?' I decided to keep it mostly intact so that I could focus on a singular issue.

"An obvious visual inspiration was Blade Runner, and I thought that a futuristic wall would enable me to play with older versus newer structures, and with the coldness of steel and hard-edged architecture.

"I used 3ds Max for all the 3D elements, and rendered mostly with the scanline renderer. Every element had a beauty pass, specular, ambient occlusion, Z-depth, velocity and normal passes. Adobe Creative Suite 5 and its dynamic link feature enabled great efficiency, by easing the switch between editorial overview (Premiere) and sub-composite mode (After Effects). Some of the dust was 3D, and made with FumeFX – the rest was done in After Effects.

"Camera tracking was done with SynthEyes. The aerial shots are the only ones provided by the competition organisers. The rest was shot by Itay Gross, my cinematographer."

David Gidali is a self-taught 3D artist who worked as the pipeline developer and later CG supervisor at Snowball | VFX. He left to study film at the Sam Spiegel Film School in Jerusalem, and then moved to study directing at the American Film Institute Conservatory.

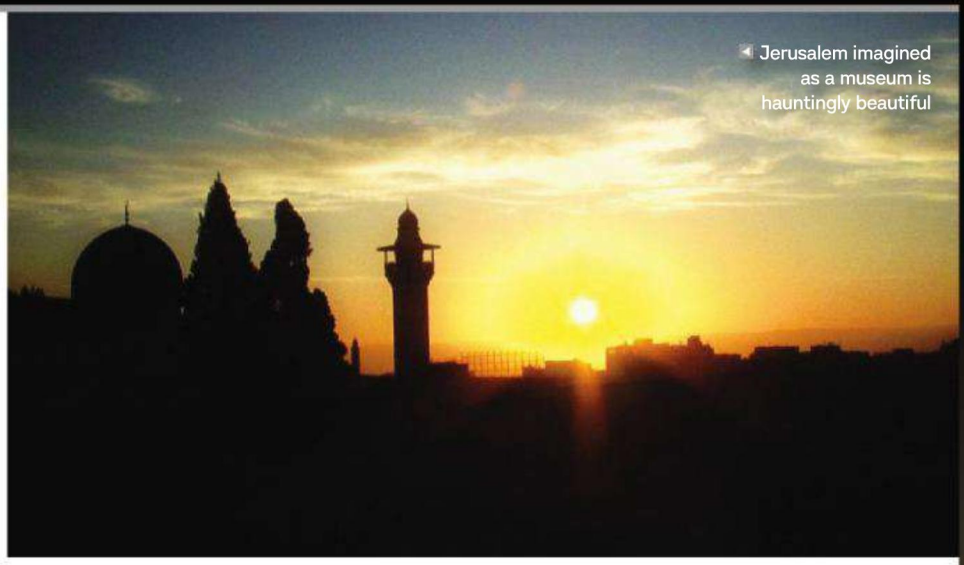


The futuristic walls enabled David to explore a combination of new and old structures in his short

## 2nd PLACE

# Paz Edry and Rotem Lehmann

Title: **Reopening**
Contact: **paz_edry@yahoo.com, rotemlehmann@gmail.com**
Paz says: "I came up with the idea of making the futuristic Jerusalem into a giant sterile museum, clear of any living beings except cats and birds. I got the inspiration for the artificial museum look mostly from the 2005 film Aeon Flux. For compositing, I used After Effects CS5 and I edited with Premiere CS5. In the final shot there's a large glass structure over Jerusalem, which was modelled in 3D by Uri Alonim in Maya 2011."



Jerusalem imagined as a museum is hauntingly beautiful

After three years in the Israeli Army, Paz Edry became a freelance video clip director in Tel Aviv. He's now in his third year at Sapir College in northern Negev. He's studying Film and Television Arts and is currently working on his final project – a pilot for a fantasy TV series.

Rotem Lehmann was born in Jerusalem and is currently a senior in the Television and Cinema department at Sapir College. She was educated in The Three Arches YMCA in Jerusalem, which teaches inter-faith cooperation – values she uses in her films.

## 3rd PLACE

# Lior Geller and Evan Lesser

Title: **Last Stand**
Contact: **liorgeller@hotmail.com**
"In Last Stand, we tried to create a fast-paced and entertaining three-minute video, but our number one priority was to our story and characters. Shot on location in Jerusalem's Old City with the Canon 7D, we edited on Avid MC5, with 3D VFX done in Maya and Adobe After Effects."

This friendly looking chap just wants directions to sites of cultural significance

Lior Geller is a young filmmaker based in Los Angeles who studied film at the Tel Aviv University Film Department in Israel. His films have so far earned over 30 international awards, including Academy Award and Emmy nominations, and a German Oscar.

Evan Lesser is director of acquisitions for Double E Pictures. He's working on a number of films, including Alone in Damascus. Most recently, he assisted in purchasing the rights for Rolling Stone article 'Hackers Gone Wild', which portrays a major cybercrime event.

**To view the other competition entries, please visit jerusalem2111.com**


High-end creations from Kollected, Joe Zeff Design and Giannini Creative Imaging show off the immense potential of digital illustration

# Picture perfect

*Considering a career in digital illustration?* ***Mark Ramshaw*** *takes a closer look at this evolving field, speaking to industry experts about the unique opportunities and challenges that still images have to offer*


Computers and animation are such natural bedfellows that it's easy to forget just how integral 3D rendering has become to still-image creation over the last few years. Today, digital illustration is more likely to involve some degree of rendered content than not, particularly in fields where technical accuracy, photorealism or a high level of detail is required. All of this means that digital illustration is now potentially a viable, and attractive, career option for those studying or already versed in the 3D arts. But should you make the switch?

While there's much commonality in terms of 3D tools and techniques between animation and illustration, many practical and conceptual differences remain. Rajeev Doshi, creative director at medical animation and illustration studio Medi-Mation, explains: "Digital animation and digital illustration are like peas in a pod in terms of absolute skill sets, but, because illustration is scrutinised in much more detail, there's a subset of skills involved in ensuring images look good up close that can involve everything from the modelling and texturing to the layout and composition."

So, other than the chance to expand your range, what attracts a 3D artist to static images? Joe Zeff of Joe Zeff Design believes that illustration work offers a kind of purity that can't be found in the animation field. "The success of an animation largely depends on technical details unrelated to the original idea. We're at our best when the problem-solving is directed toward creating one incredible image, without the distractions of motion paths, morph targets, physics simulations, character rigging and animation curves."

One person who's already made the transition is Simon Cornish at Itchy Pictures, who now focuses on illustration, having jumped ship from the animation industry. While he says the typical fees aren't comparable, the world of illustration is far less stressful and competitive: "The deadlines for my illustrations are pretty reasonable so far, much of the work is self-initiated and, of course, there's a big difference between producing one image in a week versus one minute of animation."

## Size matters

In terms of the tools used, digital illustration tends to involve the usual 3D suspects – Maya, LightWave 3D, Cinema 4D, 3ds Max, Mudbox, ZBrush and modo for modelling, and RenderMan, mental ray, Brazil and V-Ray for rendering. Animation isn't a consideration when creating single-frame images (and so rigging isn't always required, either), but worth noting is the fact that model and scene construction isn't »


'Building the Perfect Athlete', by Kollected. Nick Kaloterakis explains that a crucial thing to consider is "not just how beautiful or technically perfect the end product will be, but how successfully it will deliver a clear message".

This image was created by Kollected for an article entitled 'The Future of the Environment', which was about architect Mitchell Joachim's visionary plans to create a sustainable urban paradise.

Another illustration by Kollected, based on a concept from astronaut Franklin Chang Diaz. "We're small, but work with a large, extended family of artists who collaborate on various projects as contractors," says Kaloterakis.

necessarily tackled in the same way. Rather than creating something that will hold up to viewing from multiple angles, artists are able to focus on one camera position and optimise their assets and scenes accordingly. Not that this generally eases up the hardware demands...

Chris Morris, CGI director at Giannini Creative Imaging, reveals that renders for print are typically in the 6-8K range, with output right up to 18K not uncommon for some pieces. "The texture maps alone are often 6K or higher, while model detail also needs to be correspondingly high. We simply don't care about poly count. It's all about attention to detail."

"A high-resolution rendering of something like the cover of Time magazine contains detailed geometry and enormous texture maps that would choke most animation pipelines," agrees Zeff.

"Illustration work requires more powerful hardware than animation, as we're generally dealing with millions of polygons," says Nick Kaloterakis of illustration and animation studio Kollected. "All CG work here, with Maya as our core package, is done on Windows 7 64-bit workstations with dual quad-cores, 32GB of RAM and Nvidia Quadro graphic cards. For the Photoshop-based 2D work, photo manipulation and matte painting, we use Mac OS X with a similar hardware setup to the PCs. Final compositing is completed on 30-inch colour-critical displays."

## Managing the workload

When it comes to rendering, the overall workload is easier than it is for the multi-frame requirements of animation, but scene complexity and resolution can make it a time-consuming process. "We've had some renders take over 40 hours for a single image, though more common is four to eight hours for a high-res print image," says Morris. "We've invested in a small 40-node renderfarm to help this process."

Over at Medi-Mation, Doshi says they make use of 3D Studio Max's Backburner and strip rendering to help cope with 10K renders. "Yes, they can take a while, especially if we go a bit crazy with GI, subsurface scattering, displacement, refractions, glossy reflections and so on, but it's still just a matter of rendering one frame. And, of course, Photoshop is lightning fast for compositing in comparison to After Effects and Combustion, and also gives the ability to save on rendering by painting in details. The decision whether to render in passes can come quite late in the day and can be dependent on a number of factors from the client, including experience with what they might be likely to change, time available and the complexity of the scene."

It's arguably the way 3D fits into the overall workflow that truly differentiates digital illustration. While the animation pipeline is now very much a 3D-orientated one, illustrators mix, match and manipulate their media more freely. "LightWave is an important part of our workflow, but it's not the only tool," says Zeff. "We use photography, illustration, stock resources, contractors and whatever else makes sense given the assignment. We don't define ourselves by the tools with which we create or the »

## Expert tips Getting started in digital illustration

**1 Do it for free**
*"Volunteering in a studio or acquiring some work experience while studying will expose you to people in the industry and shed some light on the reality of working in 3D," says Nick Kaloterakis. "Beginning your career in a studio lets you experience so many facets of the industry and develop the skills you may need in the future."*

**2 Price yourself correctly**
*Freelancers should consider joining the Association of Illustrators (in the UK) or the Graphic Artists Guild (in the USA). "You'll get accurate market rates for similar commissions," explains Adam Benton. "Don't be tempted to take less for a commission just to get published. It'll cost you in the long run."*

**3 Get to know your potential employer**
*"If you're interested in joining a studio, look at their work and style, and then customise your reel and CV to show off your best and most relevant work," advises Keith Jeffery. "If you don't have examples that are suited to the area the studio works in, it's difficult to see how you'll fit. And be honest about the skills you do have and those you want to improve."*

## Kollected wisdom

"Kollected is a studio I formed two years ago in response to an increasing demand for high-level 3D illustrations," says Nick Kaloterakis. While illustration has become its trademark, with imagery featured in publications such as National Geographic and Popular Science, Kollected also produces content for broadcast and film.

"Both media have different skill sets and both are an art form," Koleterakis says. "The beauty of illustration is that it requires an eye for detail and is less labour intensive than animation. And a beautifully constructed 3D image can evoke many emotions and responses."

On the negative side, he notes that having to deal with 5K pixels or 600dpi output does make it difficult to take any shortcuts with the illustration process. "And sometimes, limitations in the design brief can result in an image that represents a very narrow expression of ideas."

kollected.com

Created by Kaloterakis's Kollected studio, these 'Future Automotive' images were inspired by original concepts from Daniel Schumpert

*"The beauty of illustration is that it requires an eye for detail and is less labour-intensive than animation. A 3D image can evoke many emotions and responses"*

***Nick Kaloterakis, Kollected***

**4** ***Learn the basics***

*More than any other 3D field, digital illustration requires strong traditional skills. "Whenever I hire a new intern, I always ask to see their non-computer artwork. I want to see who they are as a creative person first," says Chris Morris. "Learn the new technology but don't tie yourself to it. Software and hardware will change, but a strong base of artistic skills will last a lifetime."*

**5** ***Get ahead with advertising***

*Given that advertising is a key market for digital illustration, it's surprising how many artists forget that they need to promote themselves properly. Good networking and use of the web are key. "Sign up with all the ifreelance-type sites and start posting your work," advises Andrew Kerr. "Try to think where you'd look if you needed an artist, and then promote yourself accordingly."*

**6** ***Invest in hardware***

*The size and relative complexity of digital illustrations can make them surprisingly processor intensive, so don't be tempted to skimp on kit. "Get the most powerful hardware you can afford," advises Benton. "When you do finally upgrade, keep the old machine as a render node or a fallback machine. And don't forget about additional hard disks for regular backups!"*


Final visualisation of Pantene products, created by Giannini Creative Imaging. "Lighting is key," says Chris Morris. "This is why it's so important that our CGI artists all have strong traditional skills. It's easier to teach an artist how to use a new tool than to teach a skilled CGI operator what makes a pleasing image"

Advertising and branding increasingly relies on photoreal renders of products rather than photography. Photorealism and technical illustration are combined in this exploded shot of a timepiece, which was created by Giannini Creative Imaging for sports and fashion company Oakley

medium for which we create. Yes, we do CGI for print, but much more. We create images, and usually those images are part of a bigger solution."

That bigger solution refers to the illustration's role within a client's wider remit. While animators invariably answer to a higher power, and in some cases do work to a brief from an ad agency, the role of the illustrator is invariably to provide the creative muscle for the needs of a paying client. This not only requires an ability to work well with others and to provide creativity on tap, but it also ultimately means that final creative control and decisions on how the image is used lie elsewhere.

"You're getting paid to do a job, not to go off and do your own art," stresses Andrew Kerr of Dotnamestudios. "It's necessary to approach each image with thought and care, figuring out just what the client actually wants."

"Some of our clients are very exacting," says Doshi from Medi-Mation, "art directing down to the level of each specular highlight. But at the other end of the spectrum, some will give us a concept and let us run with it in terms of coming up with a visual layout and style – these are the fun jobs and allow us to try out new techniques and ideas, which hopefully feed back into other projects."

"Developing good working relationships with the client is crucial to the final image," reckons Kaloterakis. "One of our longest standing professional collaborations has been with the creative team at Popular Science magazine. Their design briefs are a Pandora's box of visionary ideas: each is clear in its objectives but always allows us the creative freedom to run with our own interpretation. Communication is regular throughout the process and the client embraces suggestions and new ideas."

Another key challenge facing illustrators and illustration studios is one of scheduling. For those who service several clients, it becomes necessary to juggle jobs, possibly tackling two or more projects at once – and all the while making each client feel like you're working exclusively for them. Clients never appreciate having to wait for an illustration because of commitments elsewhere.

"The timing of projects is a bigger hardship than actually finding work," says one illustrator, who prefers to remain anonymous. "In particular, larger projects can easily start a month or two later than planned, which leaves you twiddling your thumbs and yet reluctant to take on anything too substantial. And, to compound things, the project deadline often remains constant."

The upside to job juggling, at least for studios, is the potential to generate several revenue streams simultaneously. "Print requires smaller teams, which increases profitability, and we routinely satisfy multiple clients at once, whereas an animation-based studio might have to devote half a dozen people to a single aspect of a single project," says Zeff.

## Digital in demand

Something else that makes the illustration market attractive to many is the diversity of both clients and types of work available. In contrast to the relatively closed world of animation, there's demand for digital illustration for a whole variety of areas and project types. Digital art is now a fixture in pretty much every traditional illustration outlet, including newspapers, specialist and general magazine publications, book covers and inner content, and ad campaigns (for anything from print to billboards). Additionally, digital illustration is also in demand for newer markets, not least web and mobile-based reading.

Even for a market as seemingly limited as medical illustration for pharmaceuticals, medical devices and health insurance, Doshi reveals that the client base is surprisingly varied, including charities, legal services, stock image libraries, museums, agencies, publishers and healthcare portals. "To give some idea of the variety of our work, in the last year alone we've done projections, conference presentations, DVDs and online delivery, as well as illustrations for posters, books, magazines and newspapers," he says. "Going forward, we're also developing for iPad."

In terms of artistic styles, digital illustration is a pretty broad church, encompassing photoreal work, product visualisation, abstract imagery, infographics, technical illustrations and just about every stylised form imaginable (from cel-shaded 3D through to

> *"The nature of print is that those involved are used to close inspection. The size is unforgiving and any flaw, usually things that look too perfect, will be noticed"*
> **Chris Morris, Giannini Creative Imaging**


This still for Jim Beam was made by Giannini Creative Imaging. "Although we're often going for a 'perfect' look, we still have to add in the small imperfections that make it look real," says Morris

painterly, pen-and-ink line art and so on), often with much blurring of the boundaries in between.

While there are no hard and fast rules regarding which styles are the most profitable, more intricate work – technical or photoreal imagery, for example – will naturally tend to be the most labour-intensive and specialised, and therefore command a good price. Rates also vary depending on the size of a project (particularly if multiple illustrations are required) and type of client being serviced. "Illustration tends to get more lucrative if you have more corporate clients," says Kerr. "Coffee table books work on a flat fee and generally have less money, but provide much more interesting work, for example. It's also worth noting that print houses tend to budget in a traditional way, paying a flat fee that relates to the size of the illustration rather than its complexity. This means that large double page spreads pay well, whereas small illustrations generally translate to a lower hourly rate."

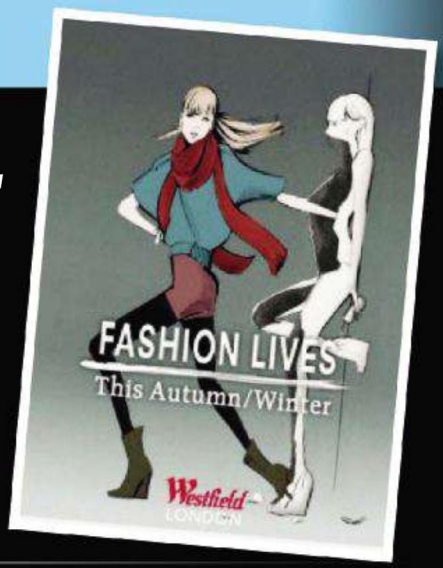
## Multiple disciplines

In terms of artistic styles, requirements vary from one market and client to another and from project to project, with multi-artist studios more likely to be able to supply the necessary expertise in a variety of styles than lone illustrators. "We pride ourselves on our range," says Zeff. "We're able to move from technical diagrams to conceptual illustration to product imagery to dimensional typography and, truthfully, we enjoy them all. We're also aggressively pursuing opportunities to create static and animated imagery for the iPad and other tablets."

"We aren't limited by a single creative style – every ad is different and so we've brought all disciplines of image creation in-house," says Keith Jeffery at print and motion production studio Taylor James. »

## Spotlight 1:
## 'Fashion Lives' by Taylor James

***Taylor James was commissioned by CHI & Partners to produce a series of shots for 'Fashion Lives', a campaign to promote Westfield Shopping Centre. The shots were created for use in high-end fashion magazines, including Vogue and Tatler, and on billboards, bus sidings, underground posters and other print media.***

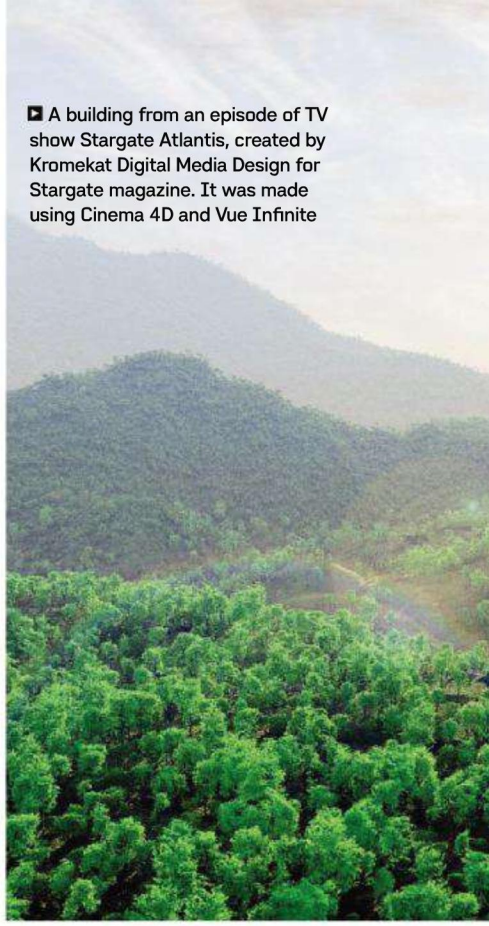



**1 Concept art**
*Layout concept art provided by the agency offered the starting point for Taylor James. The brief for the project was to provide three images of fashion models wearing autumn and winter clothes, each breaking out of the cocoon-shells of themselves wearing summer attire.*

**2 The shoot**
*David Hughes was the photographer for the shoot, with Taylor James advising on setup, lighting and camera, and carrying out an HDR shoot on location. The models were also photographed through 360 rotations, in order to provide additional sculpting reference.*

**3 Setting up the sculpts**
*The next stage of the process involved performing multiple tests to get the right look and feel for the cocoon shells. When the photo shoot was done, modellers and retouchers set about cleaning up selected model shots, ready to accommodate sculpts of the model likeness.*

**4 The final result**
*Once posed and fine-tuned, the shells were then given a broken appearance, with cracks and debris on the ground enhancing the level of realism. The whole shot was tied together in retouch, with shadows cast from the models onto the shells and a subtle colour grade also added.*



A building from an episode of TV show Stargate Atlantis, created by Kromekat Digital Media Design for Stargate magazine. It was made using Cinema 4D and Vue Infinite

**"Personally, I try to create assets I can reuse, so focus more on 3D than painting," says Andrew Kerr of Dotnamestudios. "That said, you should never shy away from 2D cheats. If you can get away with it, then do it"**

"We offer the complete range of CGI, live-action, photography and post-production services in-house, so our workload is a constant balance of CGI work for print or animation. Unified campaigns across broadcast, interactive and print media can be powerful things, and we've the ability to do all three."

The capacity to provide a one-stop shop for clients has clearly given Taylor James an advantage in the marketplace, with many of the projects in its portfolio involving complementary illustration and animation content. But it's worth stressing again that while the two disciplines are fundamentally similar, each requires a very different approach. As a result, few lone artists work in both sectors. Zeff even believes that it's a struggle for studios to do this successfully.

"Today's marketplace demands versatility, as art buyers are typically shopping for print and animation as a package, but the truth is that few print studios animate well and few animation studios do print well, because the skillsets are very different," he explains. "Animation might look amazing at 1,920 pixels wide and 30 frames per second, but it still becomes soft when presented three to four times that size and frozen in time. Our print work has models, lights, cameras and reflection maps that are configured to optimise a specific moment, kind of like getting a child to sit still for a picture. One second later that scene is a disaster."

Given the decline in print over the last few years and the general state of the economy, it's understandable that many are worried about the health of the illustration industry. Not everybody sees the changes taking place as a negative thing, however. "The decline of print is accompanied by the rise of the iPad and electronic billboards, and countless business opportunities," says Zeff.

Morris acknowledges that advertising is the first thing to get cut when times are tough. "Budgets are tight and competition is fierce. Sometimes studios even take jobs at a loss, just to keep a relationship with a client," he says.

*"Art buyers are increasingly looking for alternatives to large studios and large budgets. More than ever, virtual studios are emerging to fill a client's specific needs"*
***Joe Zeff, Joe Zeff Design***

## Step by step

Despite the challenges involved in reconciling high-end illustration and animation, market pressures and the trend for interactive content may yet make this kind of multi-tasking essential to continued success in the marketplace. "Our answer has been to leverage the talents we have in high-end print imagery and apply them to the emerging markets of interactive and animation," says Morris. "If the original assets are created with enough detail up front, then they can be repurposed for print, online, broadcast, mobile and so on."

In terms of project development, timescales will naturally depend on the scope of the brief and the client. Morris says that for a simple product shot or one-off single image, a deadline of one to two weeks is typical. For larger campaigns, and those involving more complex blending of photography and other non-CG elements, timescales can run from four through to eight weeks.

"During that time, we'll usually show work-in-progress elements or low-res comps every one to three days, so there are lots of little deadlines," says Morris. "It's also common for each of our CGI artists to have two or three projects going at the same time."

Even for digital illustration, Kaloterakis believes it's essential to start with good old-fashioned paper sketches. "They allow the artist to create a platform from which to begin their creative journey, and in

Dotnamestudios' Kerr created this image of Eomaia, a small, probably nocturnal, mammal from the cretaceous period

the long run also save time that's often wasted by jumping straight to 3D," he says. "Here, a team consisting of the 2D artist, the modeller and myself will work from an initial design brief to brainstorm our vision with these basic drawings. Composition, angles and framing follow, and then the next step is to the proxy process, followed by rough models. Then we begin to sculpt and add final details. This is by far the longest part of the process. Textures and UVs are the next stage. Lighting the illustration is relative to the composition and is the final stage before we render several different passes. The importance of the 2D process is highlighted in the final stage, where all the love and TLC go into composition, colour corrections and overall grading."

Although job roles aren't as specialised as in the animation industry, where an artist might focus solely on modelling, rigging or texturing, the diversity of digital illustration does make it difficult to define an exact list of skills required. Nevertheless, there are a few common requirements mentioned by many of those interviewed for this article, not least strong traditional art »

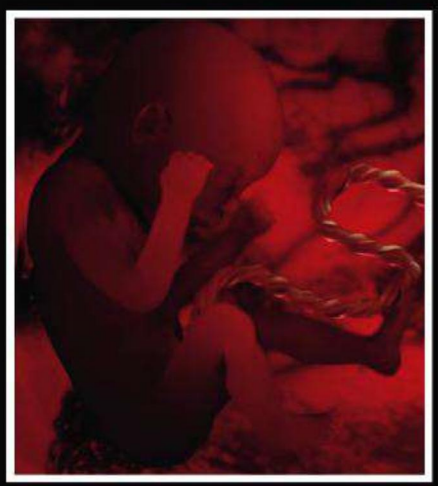
Rendered cover art for MacLife magazine, created by Adam Benton at Kromekat Digital Media Design. "I tend to work with render passes for both stills and animations where appropriate," says Benton

## Spotlight 2:
## 'Day By Day' by Medi-Mation

***Medical illustration and visualisation specialists Medi-Mation created this image of a foetus at 18 weeks for publisher Dorling Kindersley's The Day-By-Day Pregnancy Book.***

**1 Sketching the illustration**
*"The client brief can take many forms, from a simple verbal description through to pencil sketches or more detailed photomontage mock-ups," says Gavin Whelan at Medi-Mation. "In most cases, the client will supply supplementary references where relevant if they have a particular requirement about mood, texture and structure."*

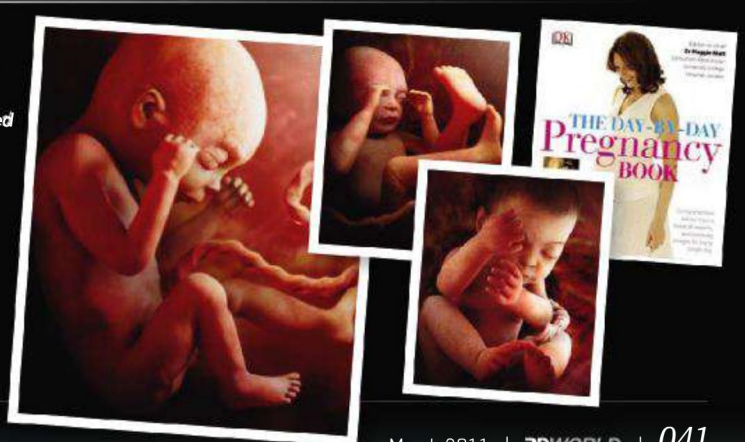
**2 Creating the 3D model (right)**
*Here, you can see the base 3D model, which was created using ZBrush. "It's given us incredible freedom to create complex organic structures and detail," says Whelan. "These 'greys' also give us the key asset that the client will comment and sign off on before we move to texturing."*



**3 Adding the details**
*Several passes add detail, including a beauty pass, ambient texture pass and an additional lighting pass for strong directional lighting. The pass shown here is for ambient occlusion. "They can radically change the look of a scene and sometimes only need to be used subtly in the final composite – and sometimes only in particular areas," explains Whelan.*

**4 Finishing off**
*This is the subsurface scattering pass, which can be dialled up or down to emphasise the scale of the foetus and thickness of the skin. An FX pass adds things like volumetric lighting, particles, hair and glow. "Combining all the elements in various ways, along with Photoshop retouching and colour correction, you arrive at a final artwork," says Whelan.*

**5 Final image**
*The finished 18-weeks image, right, appeared as part of a series showing different stages in the development of a human foetus.*




Joe Zeff Design recently completed design work for the Solar System iPad app, published by Touch Press and Faber and Faber. "The iPad is our favourite playground at the moment," says Joe Zeff. "Watching a child peel open a planet to see what's inside is just magical."


**Joe Zeff Design produced this image for Time magazine. "Photorealism is only part of what makes computer-generated illustration so powerful," says Zeff. "The ability to convey an idea is what we value most. The realism is the icing, not the cake."**

skills and knowledge, with good live imagery skills also highly valuable for much of the work.

"Working at the cutting edge of photorealism means that knowledge of photography and cinematography is vital for our artists," says Jeffery. "All our CGI artists are generalists and so have a broad expertise that allows them to cover every technical facet, regardless of the medium, working closely with our creative leads, photographers and retouchers to ensure that the highest standards are achieved without being bound by one technique."

For Kaloterakis, the job requires the right sort of mindset as much as the right sort of skills. "You need attention to detail, patience – as the process can be arduous – and you need to be a dreamer. Often, you'll need to interpret a brief that's nothing more than a rough sketch."

Zeff takes a similarly holistic view of the job. "Ultimately, we're problem solvers. Sometimes those problems require visual solutions; other times they require conceptual solutions. Often, we're presented with a blurry set of priorities and the greatest challenge is to bring them into sharp focus. Only then can we create truly effective imagery that will satisfy the client's needs."

## Starting out

For those looking to take their first steps into digital illustration, it's worth noting that, in contrast to animation, this is an area where good opportunities still exist for the lone artist. "From the point of view of not having to deal with being part of a pipeline, digital illustration is likely to provide an easier route for those who want to set up on their own," explains Adam Benton of Kromekat Digital Media Design. "I actually think it's wisest to go it alone," says Kerr, who points out that it's always possible to remotely team up with fellow freelancers when necessary.

"Work is always available for a talented, hardworking artist, whether it be freelance or in a studio," adds Kaloterakis. For those just starting out, however, he does believe that nothing can replace the experience of at least beginning by working for an existing studio. "As a junior, talented 3D artist, you'll be exposed to different projects, learn how to build positive client relationships and see the process of creating visual art from inception to final work. You'll be required to collaborate with other departments, artists and external agencies. This will build on your skills, maturity and professional experience, and allow you to then head into the freelance world equipped for success."

## *Spotlight 3: Google cover for Fortune magazine, by Joe Zeff Design*

***Joe Zeff Design was commissioned to produce a Google-themed cover for Fortune magazine, creating art for both the print and the iPad edition. "The Google cover was our first opportunity to animate for the iPad, adding a new twist to the time-honoured notion of a magazine cover," says Zeff.***

**1** ***Initial concept designs***
*Early concept renders, testing out various ways to illustrate the ideas required for the cover.*

**2** ***Client approval***
*The next stage involved getting approval for the design. Above is the final 3D render for the concept ultimately approved by the client, with the letters appearing to melt.*

**3** ***Interactive design for the iPad***
*Finally, the interactive iPad version of the concept features letters that collapse into a puddle.*

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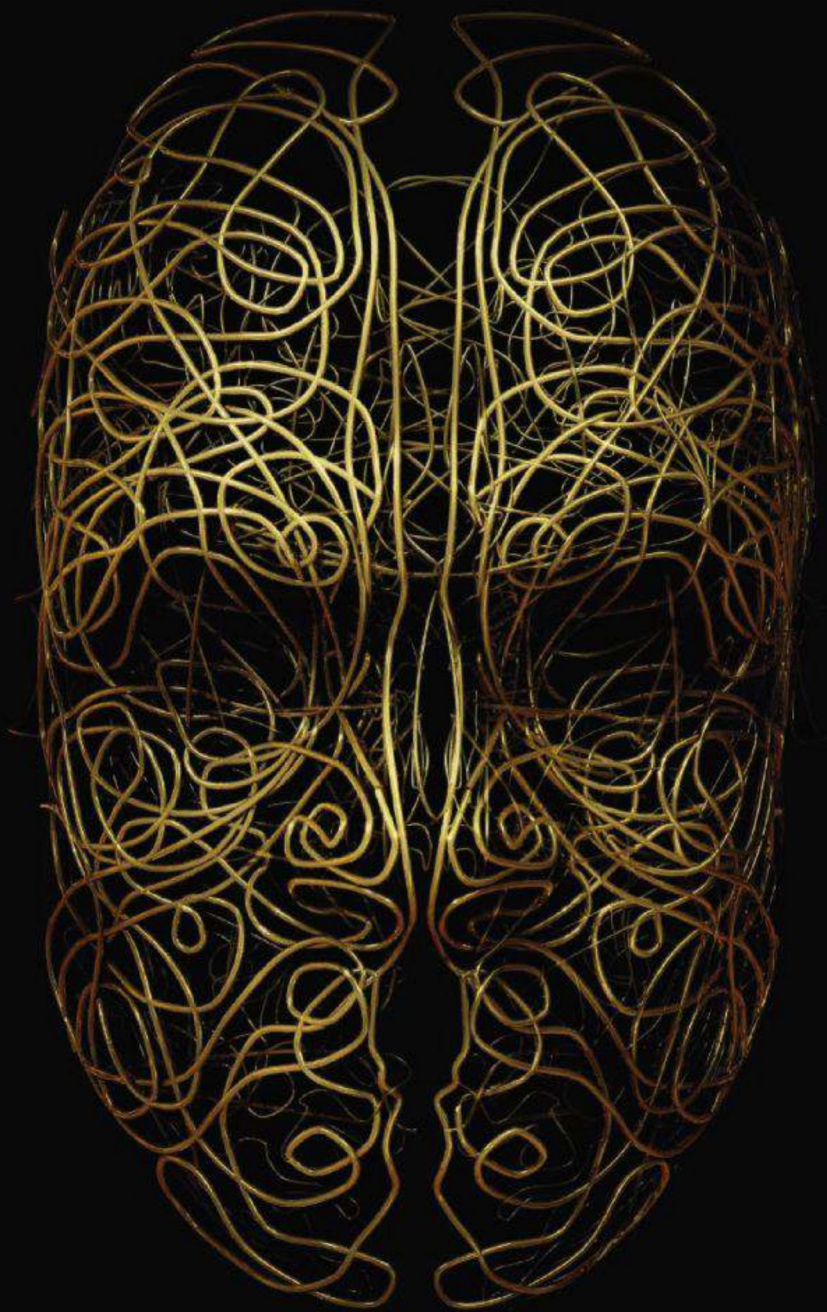

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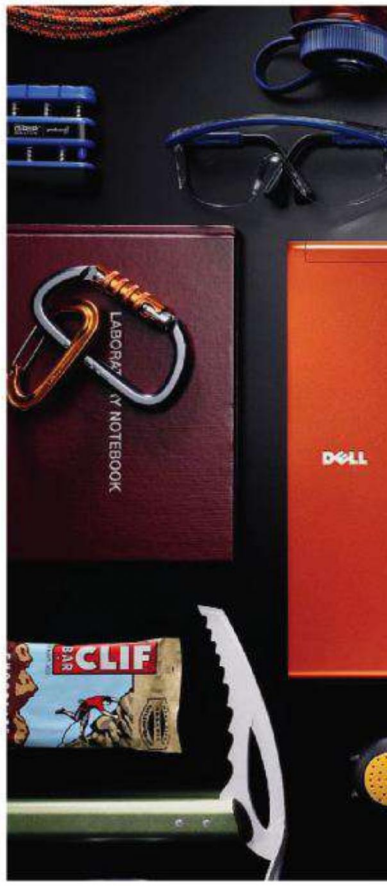


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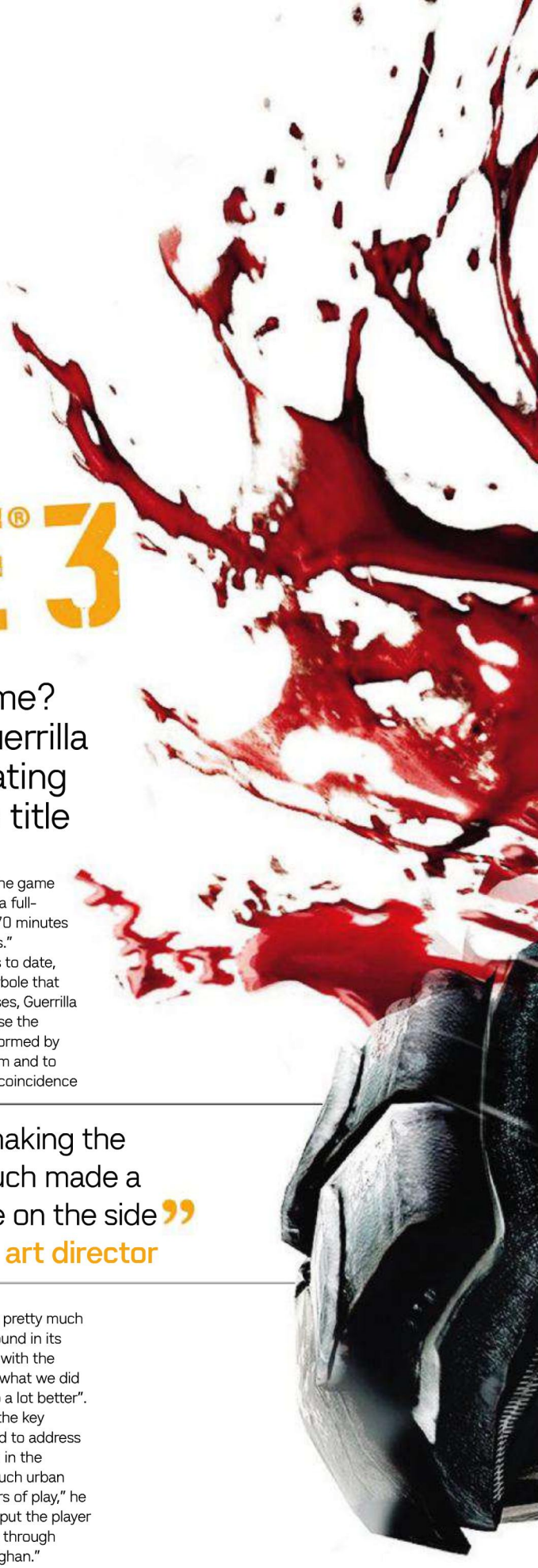
## Powering your IT needs

# The making of KILLZONE® 3

## The first must-have stereoscopic 3D game? **Mark Ramshaw** speaks to developers Guerrilla Games about the challenges behind creating this year's most eagerly awaited console title



Killing is Guerrilla Games' business and, over the last few years, business has been very good indeed. Formed in Amsterdam a little over a decade ago as Lost Boys Games, the studio struck gold shortly after a change of ownership and moniker in 2003, with the release of the first in the Killzone series. Rolling out on a huge wave of pre-launch hype, the game went on to sell over a million units for the PlayStation 2 console, instantly making the young studio one of Sony's most valued development partners. Making further headlines with a preview of Killzone 2 back in 2005 and an acquisition by Sony a short while later, Guerrilla finally delivered the second in the series in early 2009. This also went on to become a million-selling title, garnering almost universal praise from the critics and consolidating the studio's position as one of a select few truly pushing the technological boundaries of current videogaming technology.

If anything, anticipation for Killzone 3's launch has been even higher. Not least because Guerrilla has created something on an even grander scale, something even more graphically complex, and something that may well become the title that truly kickstarts Sony's stereoscopic 3D gaming revolution.

### Setting the stage

A bigger stage and new bells and whistles are all very well, but for Guerrilla Games, much of the focus for development of Killzone 3 has been on telling a more compelling story. That, admits art director Jan-Bart van Beek, is easier said than done: "Aside from the enormous struggle to find the right tone and style of putting a more character-oriented story into a first-person shooter game, it also meant we had to completely redesign our workflow and cutscene pipeline from the ground up. The game was already a monster, but while we were making the game we also ended up pretty much making a full-length CG movie on the side, creating 70 minutes of cutscenes in less than seven months."

Given the studio's incredible success to date, and the sometimes controversial hyperbole that has surrounded previous Killzone releases, Guerrilla is refreshingly honest. The desire to raise the bar with each new release is clearly informed by an unflinching approach to self-criticism and to feedback from the community. It's no coincidence that the design of Killzone 3 addresses pretty much every perceived flaw or shortcoming found in its predecessor. There's no false modesty with the candid admission that: "We really liked what we did with Killzone 2, but we felt we could do a lot better".

> "While we were making the game, we pretty much made a full-length CG movie on the side"
> **Jan-Bart van Beek, art director**

Jan-Bart van Beek says that one of the key criticisms of Killzone 2 that they wanted to address was the lack of environmental variation in the first half of the game. "It was pretty much urban cityscapes for the first four or five hours of play," he admits. "With Killzone 3, we wanted to put the player on an epic journey that would take him through different locations on the planet of Helghan."

Narrative continuity is maintained, with the new game picking up right where its predecessor left »

Killzone 3 promises to raise the bar for PS3 shooters, with bigger levels and more detail

Killzone 3

Each Killzone 3 level went through three different stages in the environment art department: First Pass, Second Pass, and Polish. Jan-Bart van Beek says that each of these stages typically took one or two months. "The environment artists try to do a minimal amount of modelling themselves and they never texture anything. It's their job to take all the assets and create worlds from it. They focus on composition, shape, flow, readability and atmosphere, while the asset artists focus on quality of the individual textures, shaders and assets."

off, so players do initially begin their adventure within familiar cityscapes. But to make sure the environments aren't too similar, the player's path this time focuses on travelling through some of the more elite districts of the planet's capital city, with the new areas built by the environment artists giving a fresh glimpse at the wealth and culture of the Helghast's aristocratic class. The storyline also gave Guerrilla's artists the opportunity to depict the city in the aftermath of a nuclear explosion. Beyond these early levels, Guerrilla then spent a great deal of time developing a wide variety of completely new environments, ranging from jungles, ice shelves and mountain tops to vast military scrapyards and – eventually – out into space.

"We wanted to ensure that each of these environments would look completely unique," stresses van Beek. "We didn't want to accidentally fall into the trap of spending lots of time building them and then seeing something similar appear in another game."

## Developing a world

With such painstaking attention paid to creating a more immersive and varied environment for the game's epic narrative, it's no surprise that Guerrilla considers level production to be the most critical process within the studio. Consequently, the environment art team is the largest in the studio by some margin. "It's their job to build the entire game world," says van Beek. "In response to the enormity of that job, we've established a very solid workflow and pipeline for the process."

> "All our levels are built from shaders and building blocks that are referenced from a repository, so fixing a problem with one asset fixes it in all levels"
> Jan-Bart van Beek, art director

That process starts with the creative direction team, whose task it is to develop ideas for settings and experiences that they want to deliver within the game. The art director then takes these to the concept art department, which begins collecting reference materials from movies, photos and other sources to help kickstart the visual creative process.

Once a piece of concept art has been signed off, it's then analysed to create a comprehensive list of the assets that will be required to reproduce it in 3D. The main ingredients here are typically shaders, building blocks and props. Props are defined as interactive elements, and may include objects that can be set on fire, smashed or simply moved around the environment. Building blocks, on the other hand, are wholly static elements. "These are the core components that comprise around 80 percent of any scene," says van Beek. "They include elements such as door frames, concrete blocks, windows and ornaments – though, in some cases, might also consist of objects such as trees or complete spaceship components."

Just one environment in Killzone 3 typically contains between 200 and 300 such elements, each of which then gets its own batch of reference material and a further brief, again with accompanying concept paintings that show exactly how the asset will be used, its textures, fine detail and dimensions.

"Most of these briefs then go straight to our outsourcing companies," says van Beek. "With all the art direction and guidance that's required, it then typically takes two to three months to get everything back. After that, the assets still receive an enormous amount of additional tweaking from our own artists, though in general the assets are in a good enough state for the environment artists to start building."

Once assets return from outsourcing, they're put into a single repository, AssetDB, so that any future changes are made globally rather than locally. "One important thing to keep into account as your projects get bigger is that it's not just about better asset management and pipelines. You need to think ahead to a point where you may need to change significant amounts of your content in a very quick and efficient way. Whether it's optimising or polishing shaders, or fixing collision issues in a level, you want to have a system where a fix doesn't just fix a single occurrence of the issue, but fixes it for all similar assets of your project."

Jan-Bart van Beek says the artistic process for the environments is dramatically different from

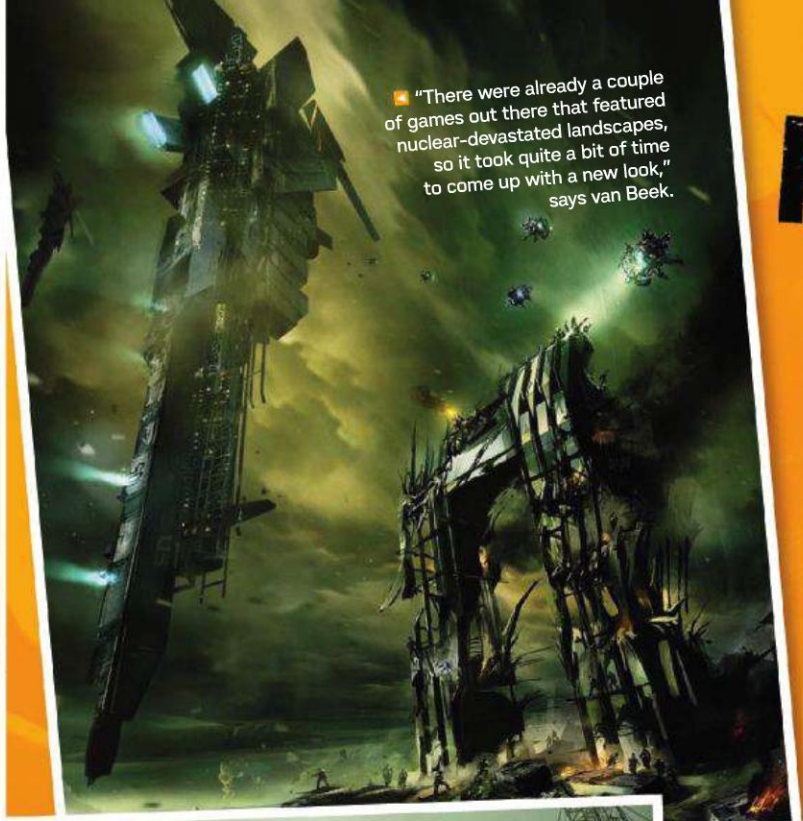
# KILLZONE® 3

## Concept Album

**CREATING AN ORIGINAL, UNIFIED AND WILDLY VARIED GAMEWORLD REQUIRES FORMIDABLE CONCEPT DESIGN TALENT...**

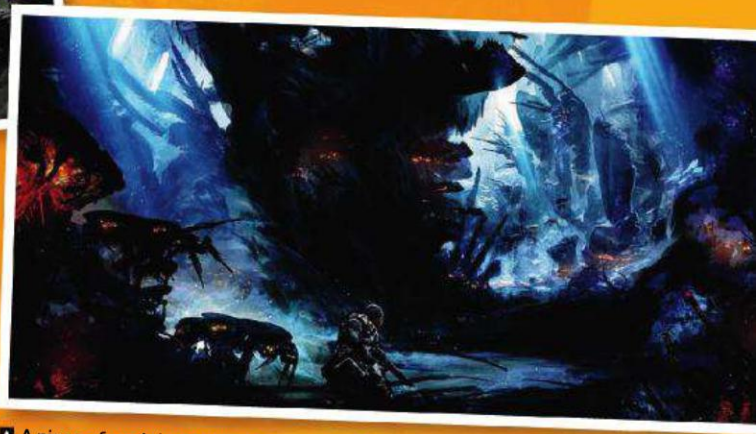
For Guerrilla Games, the use of concept art is an essential tool for immersing the player in the alien world of Helghan. More than a rough guide, these designs provide a solid blueprint for the creation of the actual 3D assets. This is especially useful given that the studio makes extensive use of outsourcing, directing the efforts of art talent from 20 countries. This external team, dubbed the 'United Nations of Guerrilla', is especially vital for the creation of the game's huge levels.

"Over the course of several weeks, the concept design team creates a large collection of concept paintings and drawings, and begins to hone in on a particular tone and style," explains van Beek. "This is then presented back to the creative direction team, who talk it through with everybody involved, from game design and asset creation to project management and animation. Once they sign it off, then the real work starts."



"There were already a couple of games out there that featured nuclear-devastated landscapes, so it took quite a bit of time to come up with a new look," says van Beek.

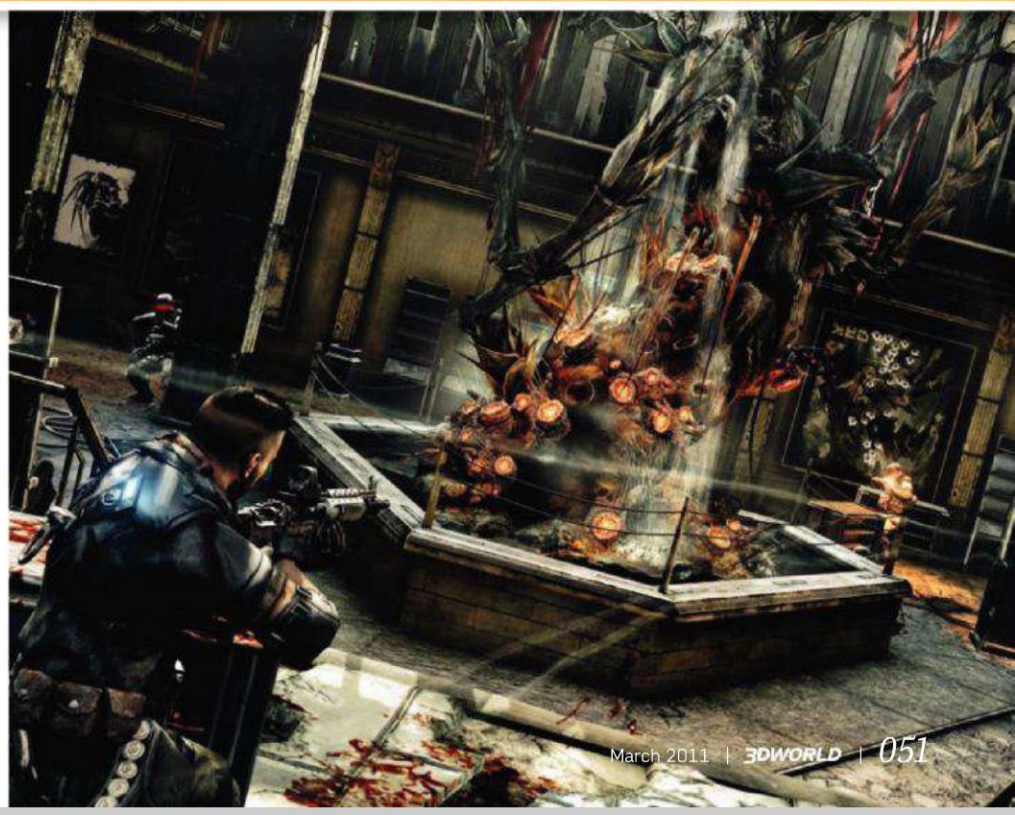
Concept design for an oil rig featured in the Arctic seas segment in the game. What's remarkable is how closely Guerrilla ultimately followed blueprints such as this one



A piece of work-in-progress concept art for Killzone 3's jungle level. Weeks are spent refining concept art ideas before anything is passed over for initial environment modelling

character creation. "They're done by completely separate groups of artists, in many cases using different custom tools and processes to create the content. Our character artists would really need to be completely retrained if they were asked to help out on buildings. The only tool that has overlap is Maya, because it's our primary platform, but even then environment artists don't really use Maya in a way that would be easy for a character artist to pick up."

Also, while there's a similar progression from concept art through to game model, there's far less reliance on outsource art talent for the character work, and generally more refining, with multiple feedback and review cycles over the course of several months. The characters are even more detailed in Killzone 3, enabling them to hold up to greater scrutiny during the new brutal melee battles in-game, and during the many cinematic close-ups in those cutscenes. For character animation, Guerrilla has once again combined motion capture (courtesy of Audiomotion), hand animation and a physics »



The animation team took the opportunity of increased detail to push the firing and reload animations to greater heights

The designs for the Helghast soldiers were initially inspired by Nazis, the Maoist army and Russia's World War II soldiers. The studio says it's now reached a point where it looks inward for inspiration, rather than to war history

## Designer Shader

"Our pipeline basically uses Maya's HyperShader, with our programmers building nodes that can be used within a Maya shader graph," explains Jan-Bart van Beek. "The artists then have the same control and flexibility as they would have using Maya's software renderer."

The use of a deferred lighting system, while conveying a number of advantages, also forces the Guerrilla artists to think creatively: "We have a very high level of control, in terms of how the textures, masks and maths all work together to create the various shader channels, such as albedo, specularity, roughness and glow. But as a deferred renderer, the lighting is actually a post-process step, so the interaction with light is the same for all the shaders on screen. That basically means the lighting model is always Lambert or Phong, so materials that require very specific interactions with light – such as subsurface scattering effects in skin and translucency with light passing through cloth – are hard to do and require considerable artistry to get right. This is something we hope to fix [in] future versions of our engine."

The use of deferred lighting has enabled the development of a 'G-buffer sampler', which van Beek says has made a big difference to the shader pipeline, allowing the artists to sample information directly from the buffers created by the deferred render. "This information allows us to do various post-post process effects, such as complex fog banks, refraction effects in water and glass, lens distortions and edge detection effects," he explains.

Pushing the game engine further has enabled Guerrilla to include larger, more complex boss models for spectacular David-versus-Goliath set-piece battles.

node system, with the in-game and cutscene facial work in particular more refined than in Killzone 2.

### Pushing the boundaries

Two years ago, when Guerrilla first began working on Killzone 3, the aim had been to lock the technology and focus exclusively on making the sequel more diverse and refined. That idea soon fell by the wayside. With Killzone 2, the studio had to create a whole range of custom tools in parallel to the game itself. Given the luxury of focusing solely on game development this time around, the team couldn't resist pushing the engine and toolset harder.

One of the key challenges when creating a narrative-led first-person action game has always been to reconcile the need to tell a story seamlessly with a need to load level information. As visual complexity rises, it becomes ever more difficult to avoid portioning gameplay into the kind of bitesize chunks that result in a frustrating stop-start experience for the gamer. Yet, despite levels many times larger than its predecessor, Guerrilla is determined to find a way to avoid loading screens or any visible delays resulting from data loading on-the-fly. The solution has been to split incoming and outgoing data into a number of smaller streams.

"We've completely rewritten our streaming systems from the ground up, so that the engine now has four concurrently running streaming systems for different aspects of the game," says van Beek.

At the base level is a system that loads in large chunks containing level geometry, enemies, weapons and other hard data. Large amounts of data are dropped from memory and new ones loaded in as the player progresses through a level. Next to this is a texture streaming system, which dynamically loads in textures as they're needed at the required resolution. "For objects further away, we load in smaller versions than for those close by. As the player moves through the world, the game constantly swaps these textures in and out to make sure they're always looking at the highest quality image."

The third streaming system deals with audio/music, with the fourth then devoted to mesh streaming. "This allows us to stream in very large blendshapes for pieces of geometry, allowing us to deform objects in a way that would be too complex to compute in real-time."

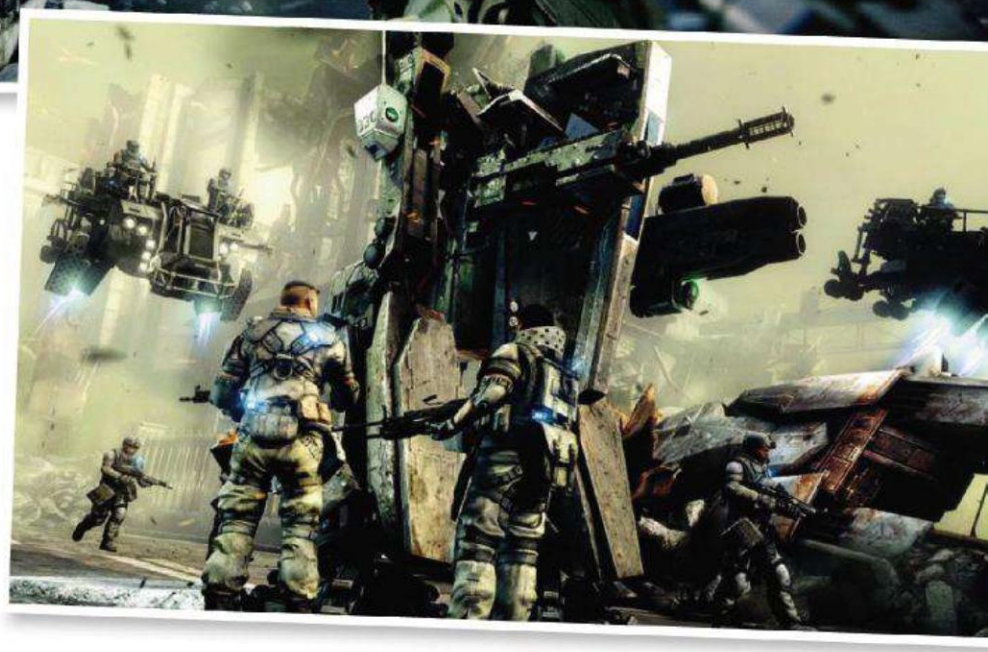
The ocean is one key element that really benefits from this deformation system. Houdini is initially used to simulate the water at high fidelity, with the rendering of each frame taking several minutes. Once the 3D meshes are generated, they can then be streamed seamlessly into memory, with the blendshapes enabling some very complex in-game geometry animation.

> "MLAA enables the game to run at 1,280x720, using an algorithm to find the jaggy edges and then smudging them in a post-processing pass"
> Jan-Bart van Beek, art director

"The last thing we did to hide loading times was to render out the game's cutscenes from the game engine and store those on disc. Although most of the cutscenes ran fine [in real-time], pre-rendering them meant we wouldn't have to load the content for the cutscenes during gameplay. And by playing the movies from disc, it leaves us with enough bandwidth to load the next level in the background."

Elsewhere, optimisations to the existing code abound, with van Beek estimating that the engine runs around 40 percent faster than before. But, rather than using that performance gain to imbue

Four new data streaming systems enabled Guerrilla to include more geometrically and texturally complex levels. They are also ten times larger than those of Killzone 2



Maya was used with a wide range of custom tools. Other software included Mudbox and Houdini, as well as custom applications such as AnimationBlender, Particle Editor, Colour Tweaker and Hyperion (a lightmap renderer)

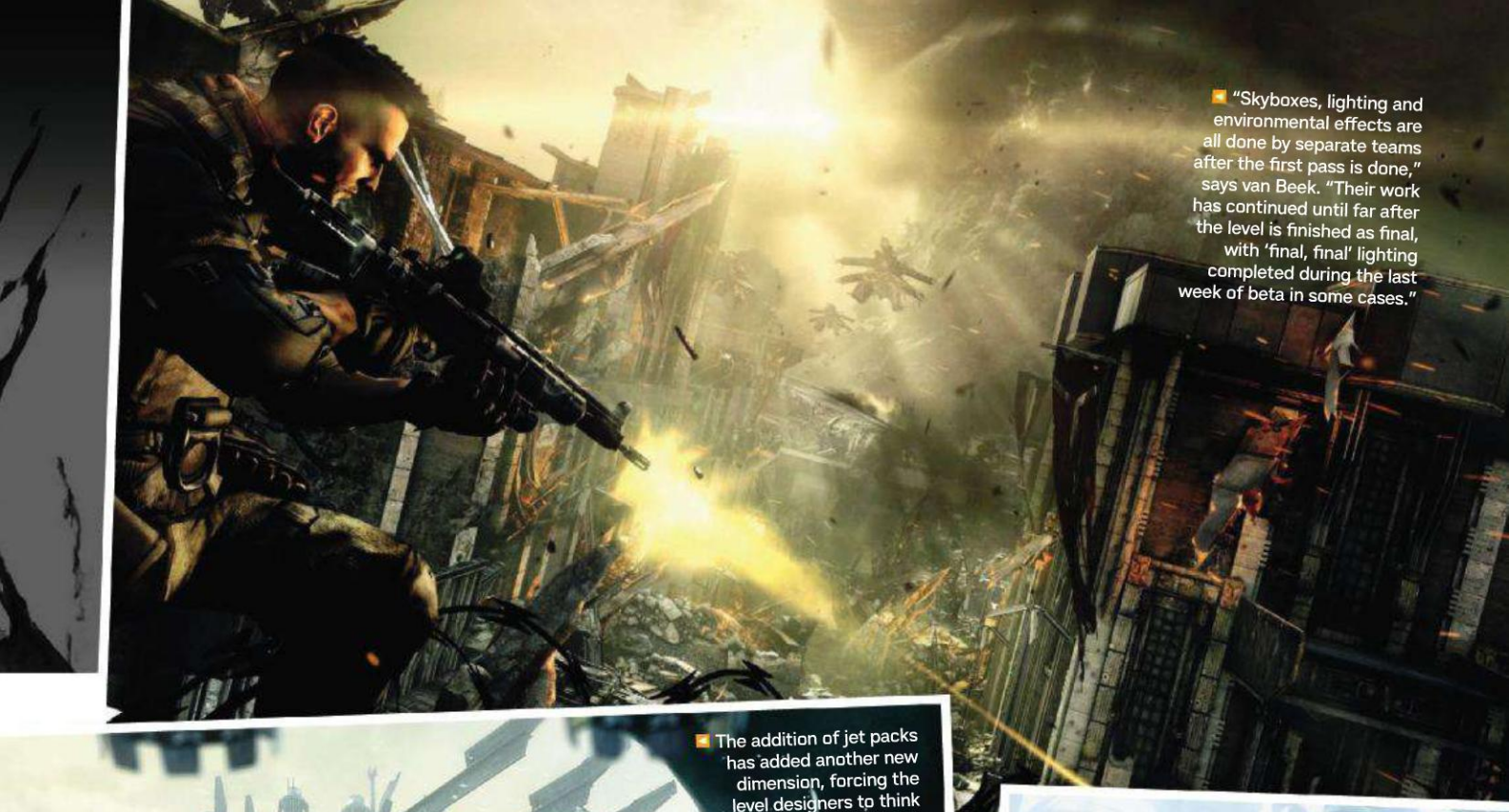
individual assets with additional detail, much of the extra muscle has instead been used to increase the volume and variety of the assets. "Texture streaming, on the other hand, did allow us to increase the resolution of many assets, because it effectively doubled the amount of texture space available."

Beyond speed gains made through engine optimisations and by removing inefficiencies in certain expensive shaders, van Beek says that the biggest performance boost has come through the introduction of Morphological Anti-Aliasing, a technique developed for the PlayStation 3 by Sony's R&D team.

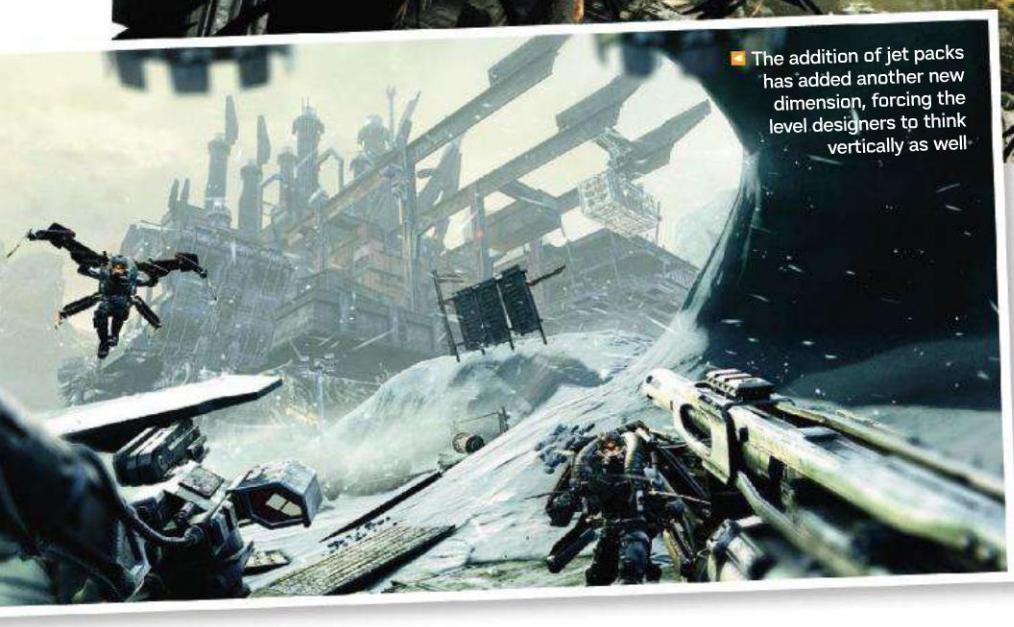
"Killzone 2 ran at a resolution of 2,560x720 pixels and was then downscaled to 1,280x720 as a way to anti-alias the image, but the side effect of this approach was that it would also blur everything a little bit, resulting in a drop in visual quality," explains van Beek. "MLAA enables the game to run at 1,280x720 pixels, using an algorithm to find the jaggy edges and then smudging them in a post-processing pass. This results in a higher fidelity image in general, but also saves a lot of performance."

Another big innovation that's been introduced this time around is occlusion-based culling. In Killzone 2, Guerrilla employed a standard portal system for culling objects that were hidden from the player's viewpoint, but this approach required the artists to manually create portals and zones throughout the levels. By contrast, the method employed for Killzone 3 automatically deals with object culling through the occlusion of the level geometry. "The engine recognises that you're looking at a big wall and will remove anything behind it without any help," says van Beek. "As well as giving »

The new weapons designed for Killzone 3 range from knives for melee combat through to weapons of mass destruction for spectacular boss battles



"Skyboxes, lighting and environmental effects are all done by separate teams after the first pass is done," says van Beek. "Their work has continued until far after the level is finished as final, with 'final, final' lighting completed during the last week of beta in some cases."



The addition of jet packs has added another new dimension, forcing the level designers to think vertically as well

UK-based Audiomotion handled the motion capture work. There's noticeably more refinement and variety to the movements this time around

> "We tried to reduce the amount of depth between the world and the overlaid interface. The crosshair sits at the same depth as the thing you're aiming at"
> Jan-Bart van Beek, art director

us much more efficient culling, it also ended up saving us a lot of time."

## Another dimension

And then, of course, there's the introduction of a stereo 3D mode. "To a certain degree, adding the stereo 3D view is simply a matter of turning it on, but the difficult part is making the thing you'll then be able to turn it on in!" laughs van Beek.

In fact, Guerrilla had already made the decision to add split-screen multiplayer to the game, so the core technology for rendering the world from two different camera viewpoints was already on the to-do list. Once that was added, however, there was still some tweaking involved to get the distance between the two 'eyes' and the convergence point just right, as well as further issues to resolve with regard to how the 3D space was to be utilised.

"The most obvious issue was where to place 2D interface elements in terms of depth," says van Beek. "We found, for example, that having interface elements at a dramatically different depth to the main background makes it quite painful to read. Where possible, we've tried to reduce the amount of depth between the world and the overlaid interface. The crosshair, for example, sits at the same depth as the thing you're aiming at."

Theoretically, creating stereo 3D is as simple as rendering the screen twice, but to maintain framerates Guerrilla had to make compromises. The machine renders two half frames (at a resolution of 640x720 pixels), rather than rendering full frames. "You might think that drawing half the pixels would already solve it, but the GPU spends quite some time setting up the triangles it needs to render the pixels. When you're rendering the screen twice, this time gets doubled no matter what the resolution is. Since we can't really make a separate version of all the content for 3D, we had to take a global approach to optimising this down. It means we have to move level-of-detail ranges a little bit forward. So in 3D, we'll show a lower resolution version of an object closer to the camera than we do in the 2D version."

Reflecting on the intense development, the art director admits he's unsure what tips he could give that would be of value to other artists and animators. Guerrilla's toolset, pipeline and overall approach is so specifically geared towards its own goals, the architecture of the PS3 and the requirements for a game of such high ambition that he believes there's little advice that would easily be transferable.

"Maybe what I do have is just a bit of philosophy," he says. "It's not supposed to be easy. If it was easy, then everyone would be doing it." ●

**Killzone 3 launches in the US on 22 March, with rollout across other territories shortly after.**


Vue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**beyond inspiration**

Vue procedural planet by Dax Pandhi

3D WORLD

# Showcase

## The month's best new commercial 3D projects

**Project: Planetarium and Science Centre**
**Studio: Marianthe Dendrou / Tugboat Creativ**

Tugboat Creativ and artist Marianthe Dendrou have completed a series of images for a Planetarium, Science Centre and Exhibition Halls Complex design proposal for Block 39 in Novi Beograd, Serbia.

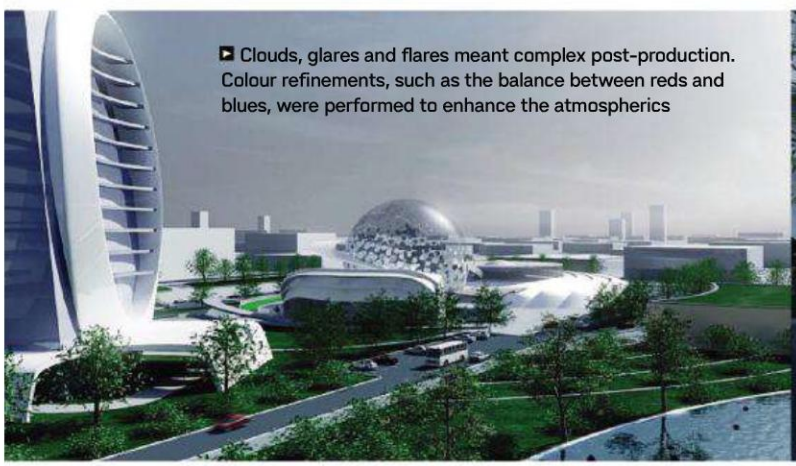
The work is from a preliminary architectural design for potential use in an international competition. It was created as a term project while Dendrou was still studying at InterGraphics in Greece.

The project was developed over six weeks using 3ds Max, mental ray and Photoshop. "In addition to the structural buildings, roads and landscapes, original modelling elements were incorporated to bring the idea to the real world," says Dendrou.

Camera views were critical in showing the attitude of the complex: a crisp design, inspired by the future. "To convey this message, delicate lighting was essential," Dendrou explains. "Balancing the light and shadows required great care in order to give the picture a bright atmosphere."

# Projects

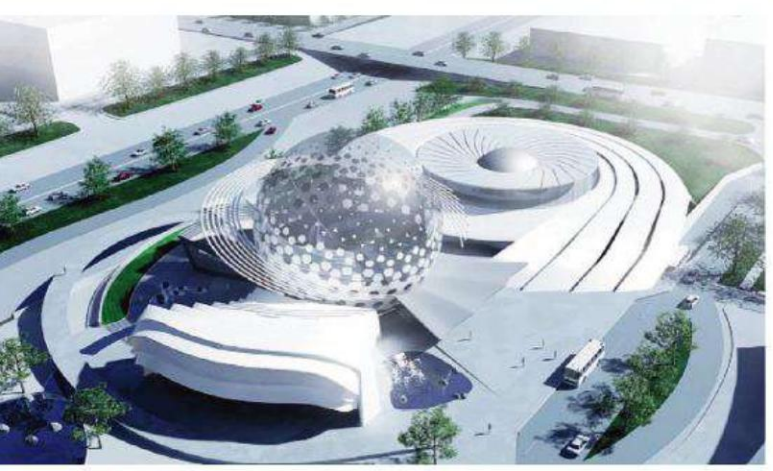
Our round-up of commercial work this issue includes designs for a planetarium and Charlex's new in-house film, ShapeShifter



Clouds, glares and flares meant complex post-production. Colour refinements, such as the balance between reds and blues, were performed to enhance the atmospherics

To save on render time in the project, the images were rendered by regions

Camera placement was a critical factor for realism. All models, cars, people and furniture are original to enhance this







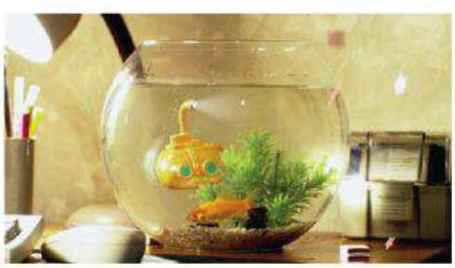

**Project:** Nintendo 'Get Thinkering'
**Studio:** Framestore NY

Framestore NY has finished work on a new spot for Nintendo, in which the studio directed and animated an army of mini-Marios for Mario vs Donkey Kong: Mini-Land Mayhem. In the 30-second spot, titled Nintendo 'Get Thinkering', the game action breaks out of the Nintendo DS Lite into a player's room.

Murray Butler and David Mellor of Framestore NY directed the commercial with the aim of showing the viewer how engrossing Mario vs Donkey Kong is to the player. "We wanted to make the spot feel as if there were two distinct styles," explains Butler. "For one style, we show the boy playing a game on a normal afternoon in an almost reportage style. For the second style, when Mario leaves the game and enters the boy's room, we shot with wide lenses and low angles in order to give the spot an out-of-the-ordinary dream sequence feel."

www.framestore.com



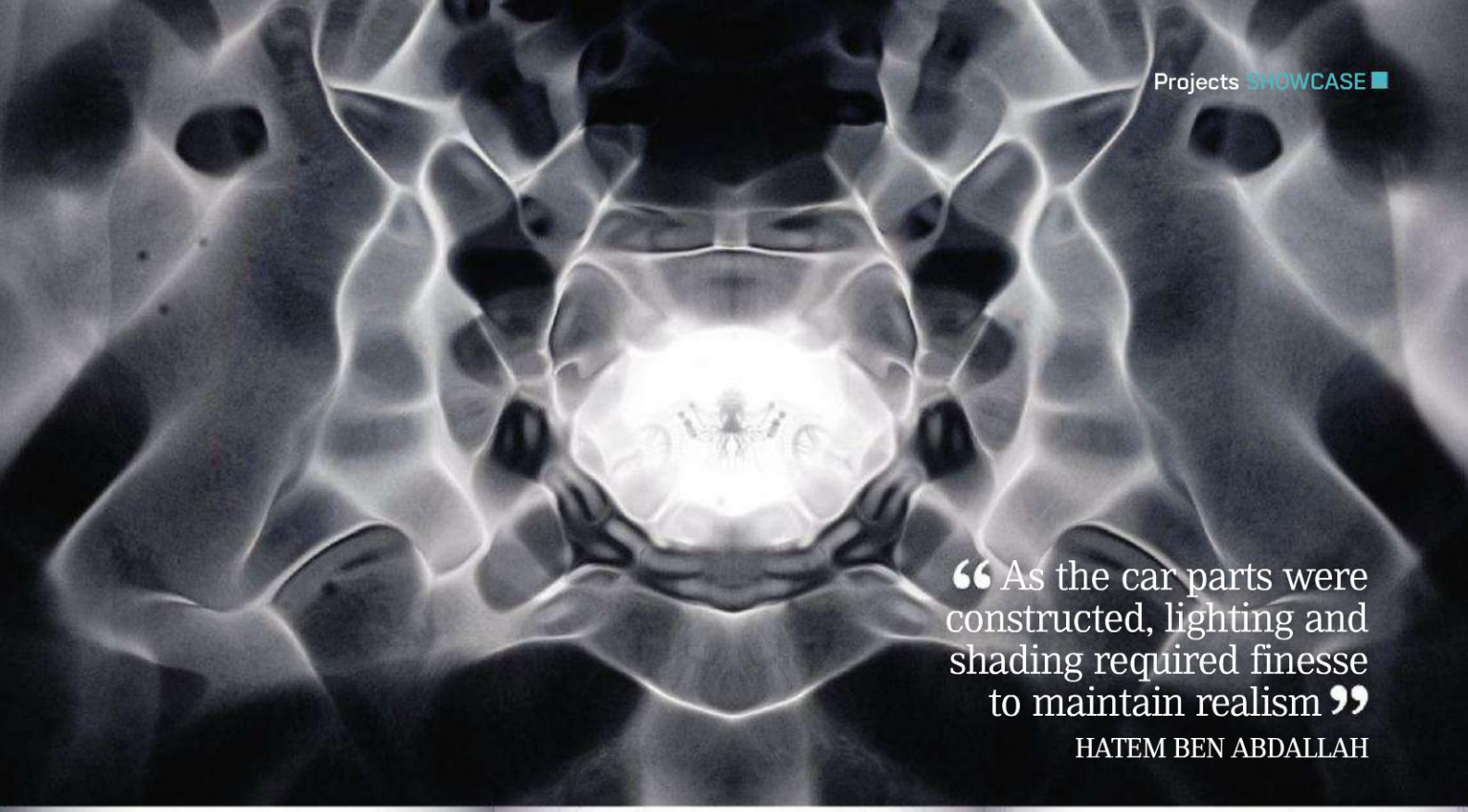




**Project:** RTE Piñata
**Studio:** Art & Graft / Seed Animation

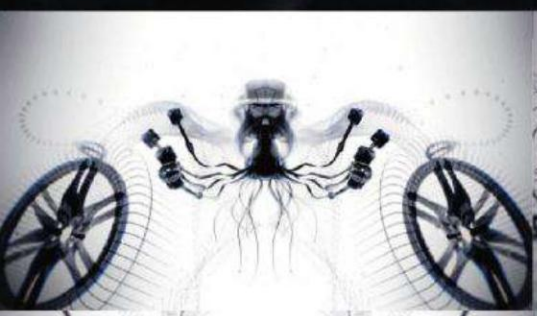
Art & Graft was asked to create a 30-second channel branding ident for Ireland's main broadcaster, RTE. In this colourful spot, an exploding piñata transforms a dull living room into a playground.

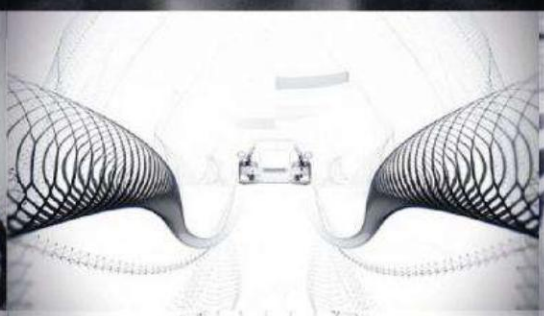
While Art & Graft designed the 3D elements in-house, it also used Seed Animation for 3D and compositing work. The studio completed all 3D work in Softimage and compositing in Nuke. "ICE was crucial in this job, as the majority was rigid body simulation, so ICE provided an exceptionally flexible workflow with very fast simming times," says Seed co-founder Neil Kidney. "We used StudioNEST's Momentum plug-in within ICE and it was astonishing how quickly it performed. With only a two-week deadline, it was essential to get quick sim times, as all the shots with CG contained sim work."

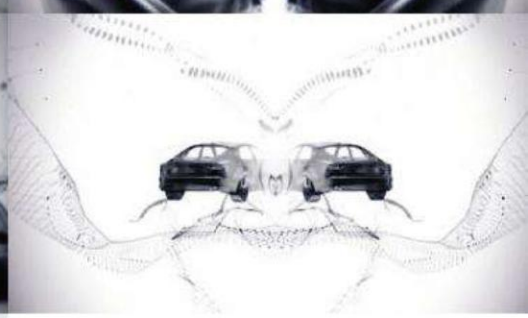
artandgraft.com / seedanimation.com



> “As the car parts were constructed, lighting and shading required finesse to maintain realism”
>
> HATEM BEN ABDALLAH







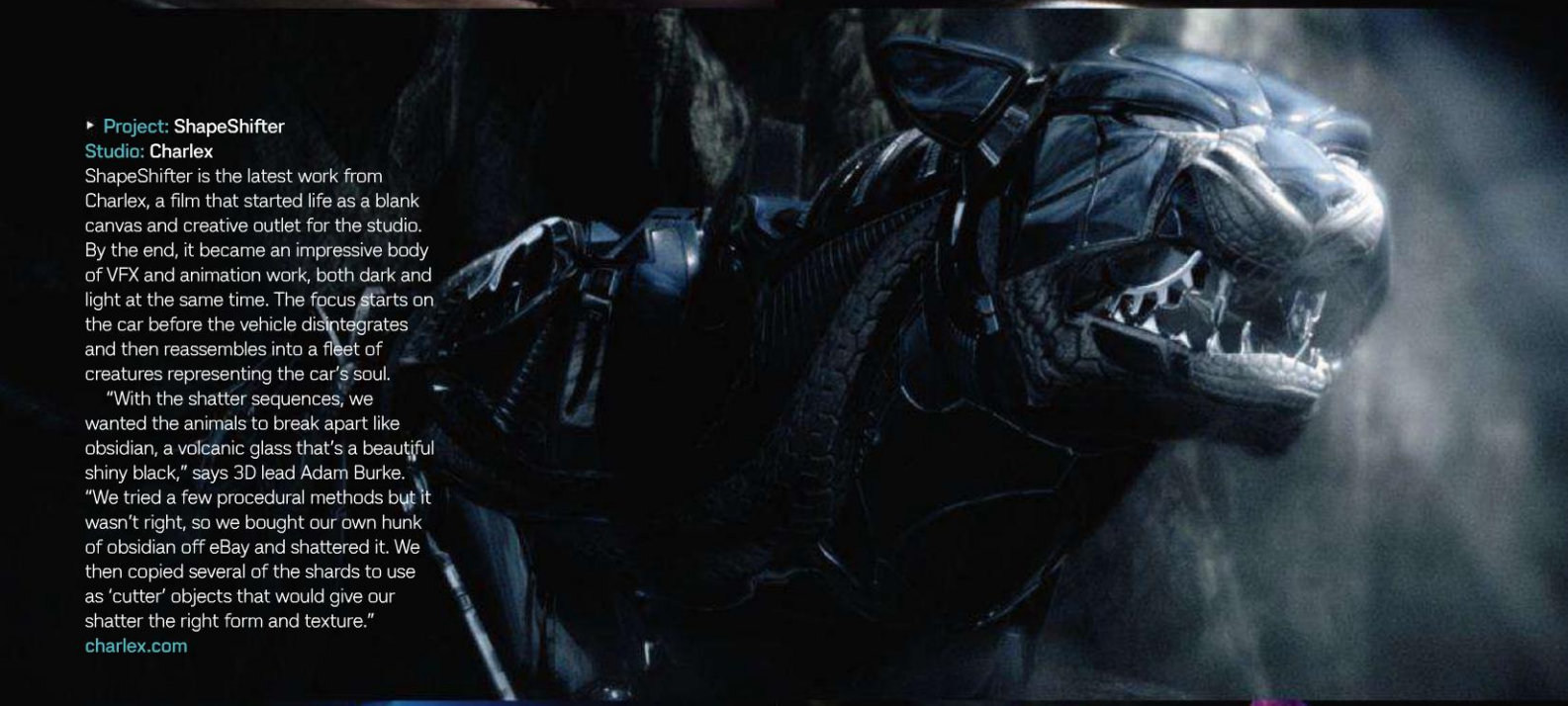
**Project:** Audi A7 Sportback ‘Imagination’
**Studio:** Blind

To showcase the Audi A7 Sportback’s innovative design and technology, Blind used its own imagination to create highly stylised visuals, taking the viewer on a journey through the mind and inspiration of an automotive designer.

Alongside 3ds Max and Boujou, Maya was the main workhorse for the spot, helping the studio to generate structural particles, pre-viz and the camera move of the fully realised car at the end.

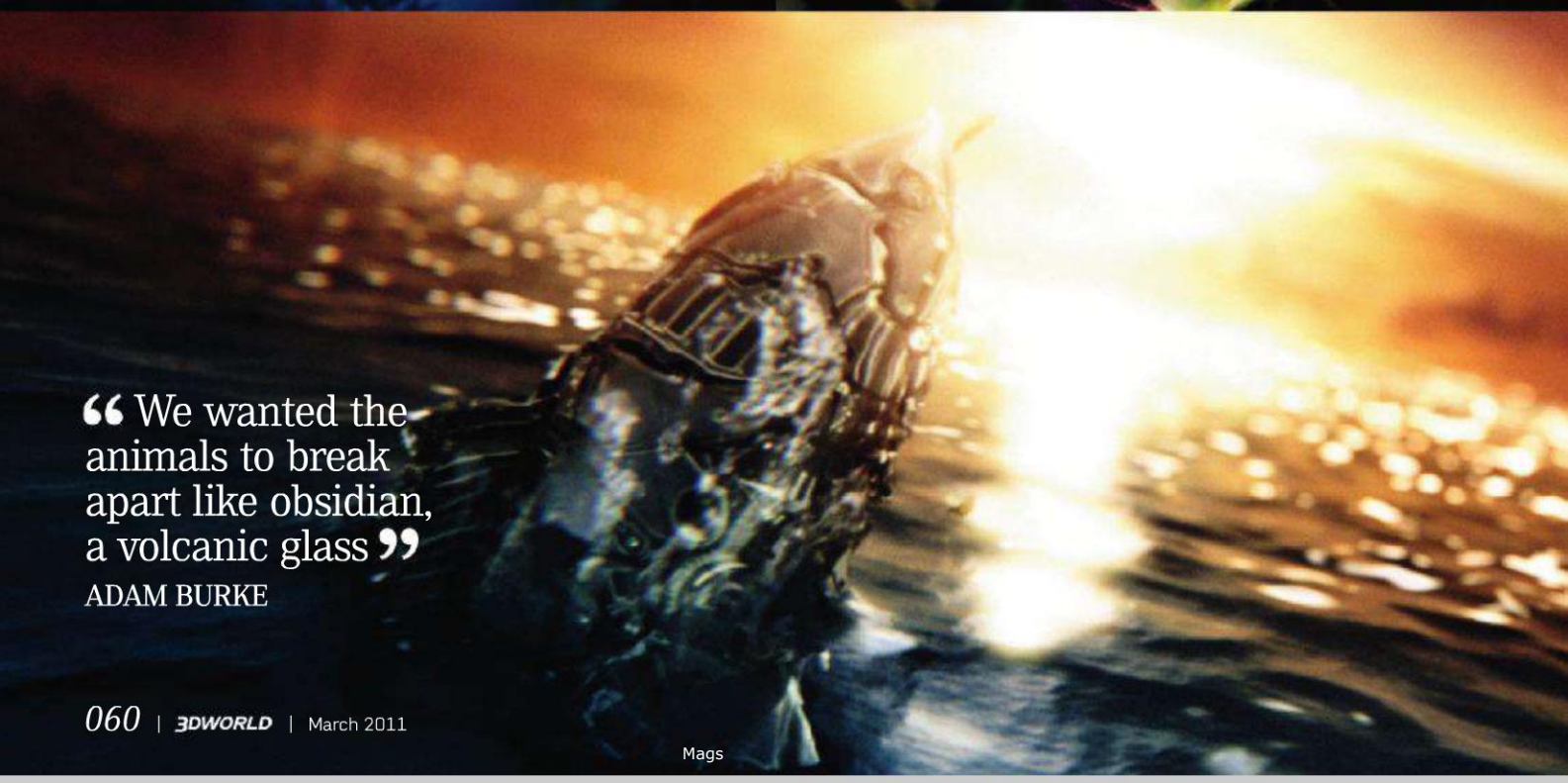
“As the car parts were constructed, our artists found lighting and shading required finesse to maintain ‘realism’, while simultaneously respecting the translucent quality established in the design,” says CG supervisor Hatem Ben Abdallah. “So while all the parts were unique, and we had to convey the varying materials, they had to feel as though they were being manifested in this designed world.”

blind.com

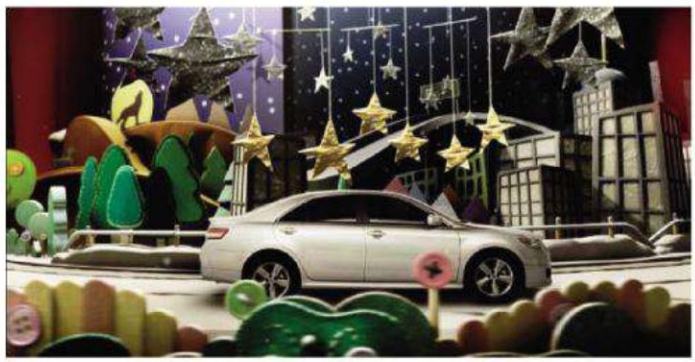


▸ Project: **ShapeShifter**
Studio: **Charlex**
ShapeShifter is the latest work from Charlex, a film that started life as a blank canvas and creative outlet for the studio. By the end, it became an impressive body of VFX and animation work, both dark and light at the same time. The focus starts on the car before the vehicle disintegrates and then reassembles into a fleet of creatures representing the car's soul.

"With the shatter sequences, we wanted the animals to break apart like obsidian, a volcanic glass that's a beautiful shiny black," says 3D lead Adam Burke. "We tried a few procedural methods but it wasn't right, so we bought our own hunk of obsidian off eBay and shattered it. We then copied several of the shards to use as 'cutter' objects that would give our shatter the right form and texture."
charlex.com



> "We wanted the animals to break apart like obsidian, a volcanic glass"
> ADAM BURKE

**Project:** Toyota Camry 'Diorama'
**Studio:** Brand New School

In this spot for Toyota, Brand New School created all animation, VFX and finishing aspects, ending up with a modern, colourful and intricate diorama. Due to a short schedule, the studio worked on a pre-viz in Maya for the entire spot before even arriving on set.

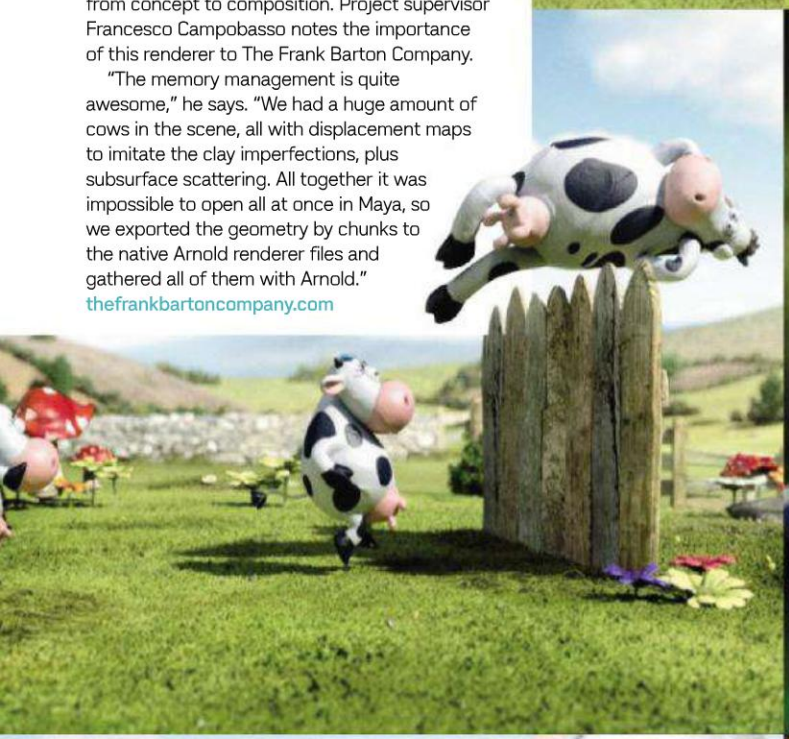
"Once the spot was shot, we got started on animation and placing the camera in the setups," says VFX director Vadim Turchin. "This saved us time by allowing us to see what the animation would look like in the context of the camera move."

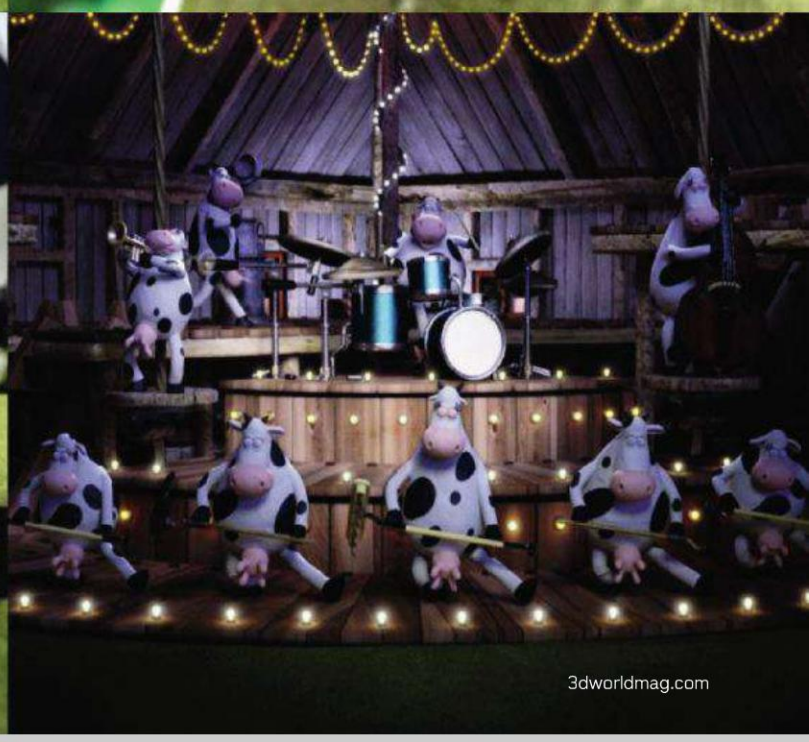
Additional software used included mental ray, Nuke, After Effects and Flame.

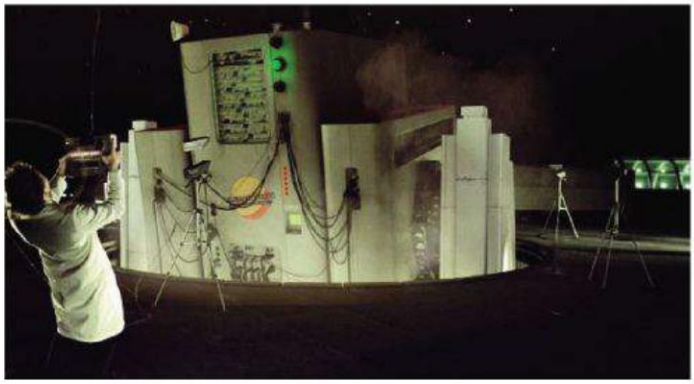
brandnewschool.com

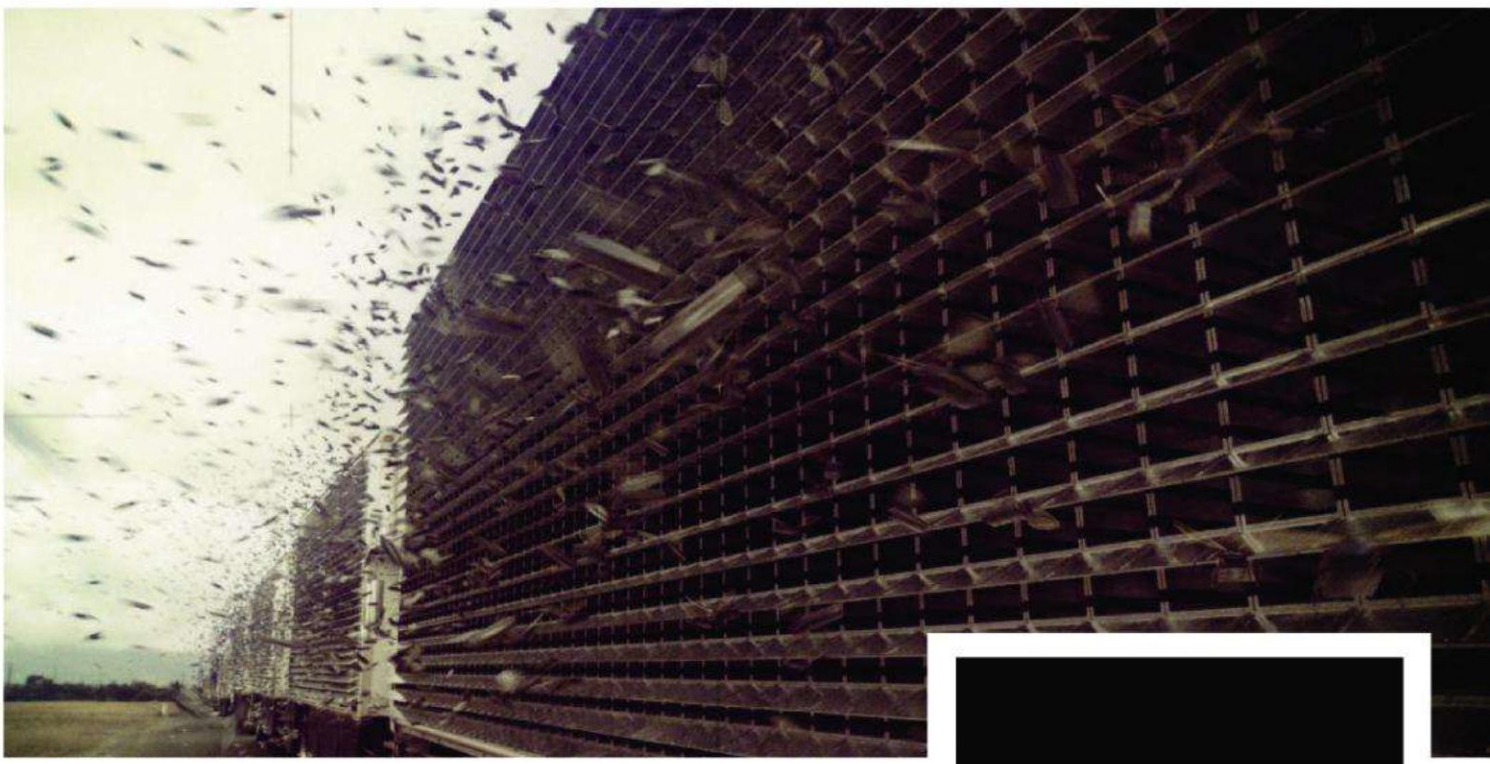
Project: **Vinamilk 'Kite' and 'Jump'**
Studio: **The Frank Barton Company**
The studio used Maya, Flame and the Arnold renderer to complete these two Vinamilk spots from concept to composition. Project supervisor Francesco Campobasso notes the importance of this renderer to The Frank Barton Company.

"The memory management is quite awesome," he says. "We had a huge amount of cows in the scene, all with displacement maps to imitate the clay imperfections, plus subsurface scattering. All together it was impossible to open all at once in Maya, so we exported the geometry by chunks to the native Arnold renderer files and gathered all of them with Arnold."
thefrankbartoncompany.com









Project: **Google AdWords 10 Year Anniversary**
Studio: **PostPanic**

Production company PostPanic has completed a unique 10th anniversary 'thank you' film for Google, aimed at more than one million Google AdWords clients worldwide.

Using a combination of live action and VFX, PostPanic took producer AKQA's script to develop a fictitious Google research department trying out ambitious experiments to feature each advertiser. 3ds Max, Maya and Nuke were used on the film. "Nuke's ability to import 3D geometry is extremely useful," says 3D artist Matthijs Joor. "It allows us to work with 3D camera tracks in the comp and we can use this to easily create masks based on object UV coordinates.

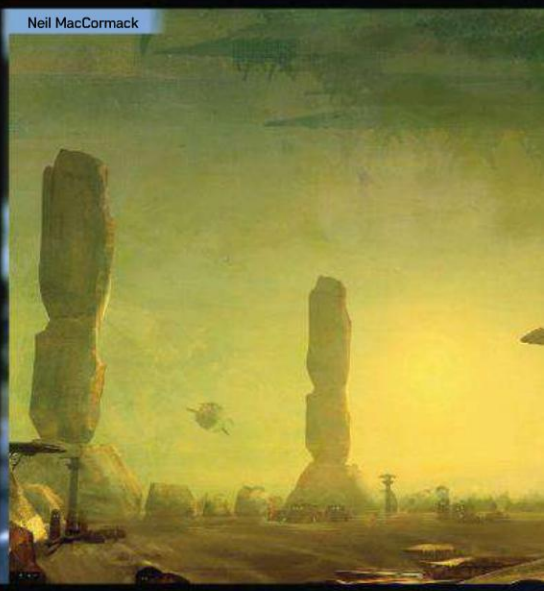
"For instance, the dominos falling are created using simple geometry and an animated texture, which are exported to Nuke," adds fellow artist Jeroen Aerts. "We could then fully time the animation in comp while looking through a moving camera."

postpanic.net

## Submit a project

If you would like to see your studio's work featured in these pages, email us at the address below, including brief technical details and at least three print-resolution stills. Please note that we can only feature commercial projects released to the public within the last few months.
**enquiries@3dworldmag.com**


CSI – Image courtesy of Zoic Studios


Neil MacCormack

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Christian Schul

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**Three winners will be chosen at random after the closing date of 5 May 2011**

Step-by-step Cinema 4D Animation

# Introduce dynamics to your animation

Let Cinema 4D do the work for you as **Anders Kjellberg** explains how to use the new Bullet dynamics simulation tools in the latest version

**FOR**
Cinema 4D R12

**TIME TAKEN**
One hour

**TOPICS COVERED**
- Bullet rigid body dynamics
- Using the new Motor system
- Using the new Connectors
- Adding MoGraph

**ON THE DISC**
- Scene files
- Screenshots
- Final animation

**ON THE WEB**
- Video tutorial
3dworldmag.com/140

**About the author**
Anders Kjellberg is a freelance 3D artist. Based in Sweden, he mainly works on still images for magazines, but branches out occasionally with motion graphics for Swedish television
dogday-design.se

Dynamics can handle a lot of the hard work in animation, enabling you to set up cause-and-effect behaviours within a scene, then sit back and enjoy the results. For many, the first experience with anything dynamic in Cinema 4D was with its now-discontinued Dynamics module. For nearly as many, it was something of a brick wall you banged your head against, but that never really collapsed. Then Maxon released Cinema 4D R11.5 with MoGraph dynamics – and suddenly, brick walls were collapsing all over the place. Dynamics in Cinema 4D were now fun, easy and intuitive.

Hitting the shelves in 2010, Cinema 4D R12 included a new dynamics system. In this tutorial, I'll introduce you to some basic aspects of the dynamics, and how to use them in combination with MoGraph. You'll start by rigging a vehicle for movement using a Motor attached to Connector Hinges, then fill this vehicle with a cargo consisting of spheres. The vehicle will drive away, crash into

**Create** this complete animation in Cinema 4D

Use MoGraph and the new dynamics system in Cinema 4D R12 to animate this scene

a group of obstacles and stop, at which point the cargo will be pushed out by a plate.

The new dynamics system in Cinema 4D R12 isn't overly complex, but there will be quite a lot of things to keep in mind. Each stage here has an accompanying scene file, so if you lose track of what you're doing, just refer to these. As always with tutorials, this isn't the only way to accomplish the end result, so do experiment with the settings. Good things can happen from VFX accidents.

**WATCH THE VIDEO TUTORIAL ONLINE**
Follow the entire workflow for creating cause-and-effect behaviours
**3dworldmag.com/140**

# STAGE ONE

## Setting up Connectors and a Motor

**First off, you'll add two Connectors and hook them up to the front and back wheels, with the chassis of the vehicle as their shared anchor point. After that, you'll add a Motor to get the vehicle to move and assign Dynamics Body Tags to the various parts to make sure that they all behave and interact in the correct manner. Finally, the speed of the Motor will be animated, so the vehicle starts its movement at one place and stops completely at another.**

### 01 Add Connectors

Open dynamics_start.c4d from this tutorial's project files. Add Simulation > Dynamics > Connector. Select Connector in the Object Manager, then choose Functions > Transfer and drag the BW object from the Object Manager to the Transfer To field. Once the Connector is in place, set Rotation H to 90 to rotate the Connector, so it lines up with the back wheels' axis.

### 02 Hook up the Connectors

Rename the Connector object **Connector BW** and duplicate it. Rename the copy **Connector FW**, then drag the FW object into its Transfer To field. Untick Enable Rotation. Make the two connectors children of the Wheels group, then select Connector BW. In the Attribute Manager, make sure that Type is set to Hinge. Drag HyperNURBS BW into the Object A field and Chassi into the Object B field.

### 06 Animate Motor speed

Now select the Motor. In the Object tab, set Angular Target Speed to 500 and Torque to 100. Scrub the Timeline to frame 100 and set a keyframe for Angular Target Speed. Scrub to frame 140, reduce Angular Target Speed to 0 and set another keyframe. This makes the vehicle drive at full speed for 100 frames and come to a complete stop 40 frames later.

# STAGE TWO

## Filling the vehicle with spheres

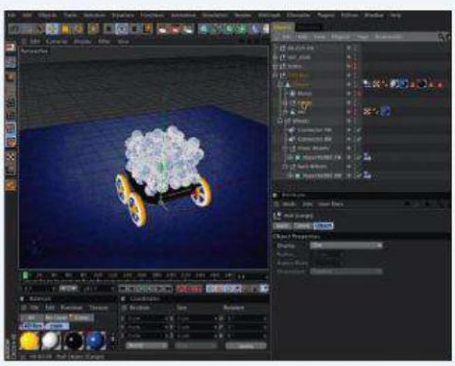
**In the second stage of the project, you'll fill the vehicle with its cargo of spheres using a MoGraph Cloner. You'll also add a bottom plate, which will be animated to push the cargo out of the vehicle. One thing to keep in mind at this point is to do as many actions as possible at frame 0. Some actions, such as setting keyframes, must of course be done at certain frames, but it's a good idea to work as much as you can at frame 0.**

### 07 Set up the container

Select File > Merge Objects in the Object Manager and load dyn_plate.c4d from the project files. Keep it outside the C4D Box hierarchy for now. To better see what's happening, hide the Lid object using its visibility indicators. Select Chassi and double-click the rightmost Selection Tag, named bottom. Choose Selections > Hide Unselected to isolate that selection of polygons.

### 11 Simulate the spheres dropping

Now select the Cloner Dynamics Body Tag; in its Collision tab, change Individual Elements to Top Level. To prevent the vehicle from moving when the spheres fall around it, select both Dynamics Body Tags for the wheels; in the Dynamics tab, set Dynamic to Off. Finally, disable the Motor and press Play. Let the simulation run until the spheres have settled – around frame 115 – before you stop it.

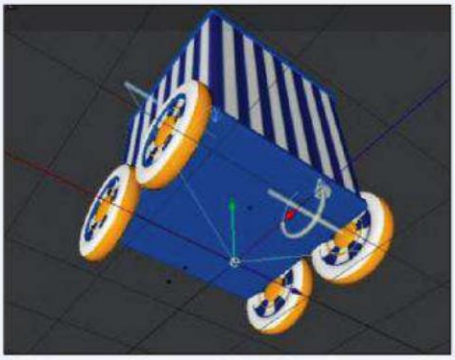


### 12 Get the spheres to stay in place

Select Cloner's Dynamics Body Tag; in the Dynamics tab, click Set Initial State. Go to frame 0. Create Objects > Null: name it **Cargo**. Group the Cloner and Random Effector under it, then make Cargo a child of Chassi. Select Chassi. Make sure you're in Polygon mode, then set Position Y to the value you noted in step 8 and click Apply.

### 13 Ghost the Dynamics tag

With the bottom polygons back in place, you'll notice if you press Play that the cargo spheres drop down a bit. To fix this, select the Cloner Dynamics Body Tag; in the Dynamics tab, set Dynamic to Ghost. With the tag still selected, scrub the timeline to frame 139 and set a keyframe for Dynamic. Jump a frame forward to 140, set Dynamic to On and set another keyframe.



## 03 Set up the Motor

Select Connector FW and repeat the process, but drop HyperNURBS FW into the Object A field. Add Simulation > Dynamics > Create Rigid Body to both HyperNURBS BW and HyperNURBS FW. Add a Simulation > Dynamics > Motor and place it as a child of Chassi. Rotate the Motor by 90° in H. In Motor's Attributes, drag HyperNURBS BW into the Object A field and Chassi into the Object B field.

## 04 Add Dynamics tags

Choose Chassi in the Object Manager and add Simulation > Dynamics > Create Rigid Body. If you press Play on the timeline, the wheels will spin but the whole vehicle will drop right down, so you need a ground for it to drive on. Expand the Scene group, then change the visibility of the Floor object by double-clicking on the two visibility indicators until they turn green.

## 05 Change Friction

Select the Floor and add Simulation > Dynamics > Create Collider. Press Play, and the vehicle should now drive away. However, the wheels aren't spinning correctly. Select the Dynamics tag for both HyperNURBS BW and FW, then choose the Collision tab and change Bounce to 0% and Friction to 170%. This makes sure that the wheels get a better grip on the ground.

## 08 Build the cargo

Under Coordinates Manager, note the Y value of the polygons: you'll need this later. (See the video for a sneaky way to temporarily store the value inside your scene file.) Move the polygons in Y until they're slightly above the plate. Select Objects > Primitives > Sphere and set its Radius to 18. Now select MoGraph > Cloner and make the Sphere a child of the Cloner.

## 09 Create a grid array

In the Cloner's Attributes, set Mode to Grid Array, Count to 4, 7, 4 and Size to 133, 626, 133. While you still have the Cloner selected, add MoGraph > Effector > Random Effector. Under its Parameter tab, untick Position and set Color Mode to On. You'll use Color Mode while texturing the spheres later.

## 10 Define a Moving Mesh

Select the Cloner and move it up in Y until the lowest spheres are slightly above the plate. Add Simulation > Dynamics > Create Rigid Body. If you press Play now, everything will go haywire: that's because the Dynamics Body Tags need adjusting. First, select the Chassi Dynamics Body Tag; in its Collision tab, change Shape to Moving Mesh.

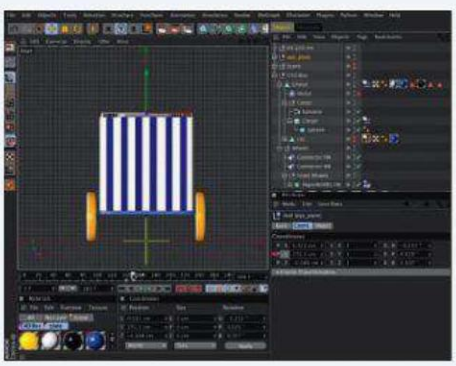
# STAGE THREE

### Pushing it all out

**Now that you have the vehicle's movement set up and the cargo of spheres is in place, let's focus on getting them out of their storage. The plate you added earlier will push these spheres out. You'll animate the position of the plate so that when the vehicle stops, it will jump up from its resting position to just above the rim of the vehicle. After that, you'll define the plate as a Collider, so when it moves up, it will hit the mass of spheres and in turn push them out. Finally, you'll use a MoGraph Delay Effector to add some secondary movement to the plate.**

## 14 Prepare the Lid

Next, unhide the Lid via the Object Manager and select it. Add Simulation > Dynamics > Create Rigid Body. In the tag's Attribute Manager, untick Enabled in the Dynamics tab. Scrub to frame 139 and set a keyframe. Scrub to frame 140, tick Enabled and set a new keyframe. This will make sure that the Lid reacts dynamically to the mass of spheres pushing up from underneath.



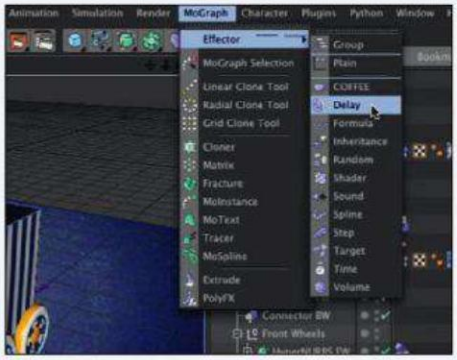
## 15 Animate the pushing plate

Now it's time to animate the plate. Staying in Polygon Mode, select Chassi followed by Selections > Unhide All. Scrub to frame 140 and select dyn_plate. In the Coord tab, set a keyframe for Position Y. Scrub to frame 148 and move dyn_plate up in Y until its top is slightly above the rim of the vehicle. Set a second keyframe.

»

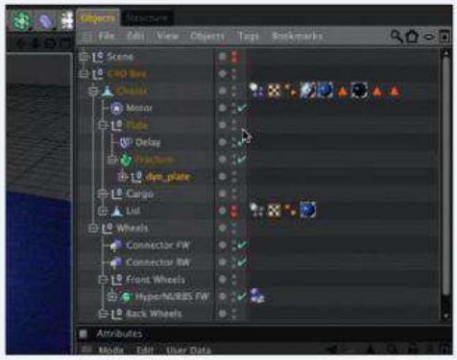
## 16 Add a Collider to the plate

Rewind and press Play to make sure the dyn_plate group is moving. Scrub to frame 139. Expand the dyn_plate group, select the object named plate and add Simulation > Dynamics > Create Collider. In the new tag's Attribute Manager, untick Enabled in the Dynamics tag and set a keyframe. Scrub forward one frame to frame 140, tick Enabled and set a second keyframe.




## 17 MoGraph Fracture object

To get some secondary movement on the plate as it pushes the cargo out of the vehicle, scrub to the beginning and select MoGraph > Fracture. With the new Fracture object selected, add MoGraph > Effector > Delay. In Delay's Effector tab, set Mode to Spring. Create a new Null: name it **Plate**, and make Fracture and Delay children of it.

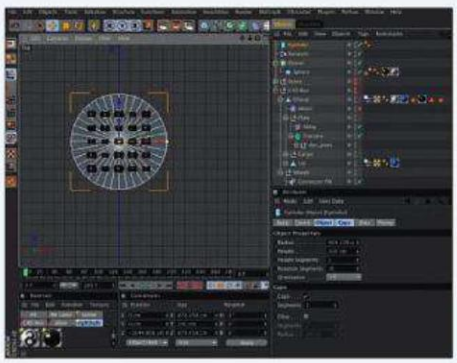


## 18 Add secondary movement

Make the Plate group a child of Chassi, then make dyn_plate a child of Fracture. Unhide the Lid and activate the Motor. Set Dynamic to On for both wheel sets' Dynamics Body Tags and run the simulation to check that everything's working. The vehicle should set off then stop at frame 140, at which point the plate pushes out the spheres and swings a bit before stopping.

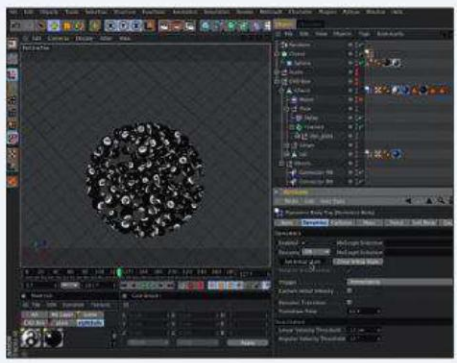
## 21 Clone the eightballs

Add MoGraph > Cloner, and make the Sphere a child of it. Move the Cloner to roughly where the vehicle will stop. In Cloner's Object tab, change Mode to Grid Array, then set Count to 5, 6, 5 and Size to 500, 1000, 500. Add MoGraph > Effector > Random Effector with Position unticked and Scale activated. In the controls that appear, tick Uniform Scale and set Scale to 0.6.



## 22 Prepare the cylinder

Move the Cloner up in Y until the lowest spheres are a bit above the ground. Create Objects > Primitive > Cylinder; in Attributes' Object tab, untick Caps. Scale and position the Cylinder so that the entire Cloner object is more or less inside it. Now select Cloner and add Simulation > Dynamics > Create Rigid Body. In the Collision tab, set Individual Elements to Top Level.



## 23 Falling eightballs

With the Cylinder selected, choose Simulation > Dynamics > Create Collider. In the Collision tab, set Shape to Moving Mesh. Play the simulation, then stop when the eightballs are still. Delete the Cylinder. Select the Cloner's Dynamics Body Tag; in the Dynamics tab, click Set Initial State and set Trigger to On Collision. Unhide C4D Box and activate Motor.

## 26 Add more shaders

Click Add to create a new shader, then paste in the channel information and adjust the colours to vary your spheres' appearance. When you're happy, go back to the main Color channel settings, then click the arrow next to Texture and choose Copy Channel. Activate Luminance, then set Brightness to 0% and Mix Strength to 50%. Click on the arrow next to Texture and choose Paste Channel.

# STAGE SIX

### Wrapping up

**The final stage consists of two main tasks. You'll add ambient occlusion to the floor material to better ground the vehicle and all the spheres, and animate a Target Camera. Ambient occlusion helps to reinforce the impression that objects are touching the ground and not floating above it, which can happen with such a basic lighting rig as the one in this scene. Keep in mind that ambient occlusion will always increase render times. You'll wrap up by adding a Target Camera and animating it from a low position at the start of the animation to a higher position at the end of the vehicle's movement.**

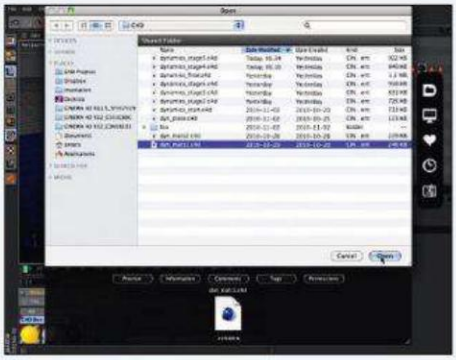
## 27 Select Ambient Occlusion

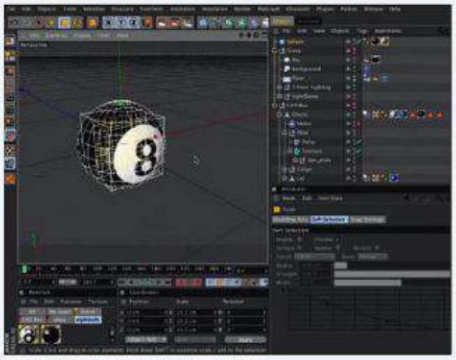
Unhide the Lid. Select the floor material in the Material Manager's scene layer; in its Basic tab, activate Diffusion. In the Diffusion tab, click the arrow near Texture and choose Special Effects > Ambient Occlusion. Select Objects > Scene > Target Camera. Move the Camera.Target to the centre of the group of eightballs. Select Cameras > Scene Cameras > Camera to view the scene through the new camera.

# STAGE FOUR

## Enter: the eightballs

**In this stage, you'll add eightballs for the vehicle to drive into. You'll start by texturing a Sphere, then add it to a MoGraph Cloner. You'll add some dynamics to get the spheres to drop to the ground; to keep them from bouncing everywhere, you'll use an open Cylinder as a container. Once you have them in place, you'll delete the container and lock the spheres in their position, ready to be rammed.**





### 19 Create the eightball

Start by disabling the Motor, then hide the C4D Box group. Create Objects > Primitive > Sphere and set its Radius to 30. In the Material Manager, select File > Load Materials and choose dyn_mats1 .c4d from the project files. Two new materials will appear in the Material Manager. Drag the eightball base material onto the Sphere, leaving Projection set to its UVW Mapping default in Attributes.

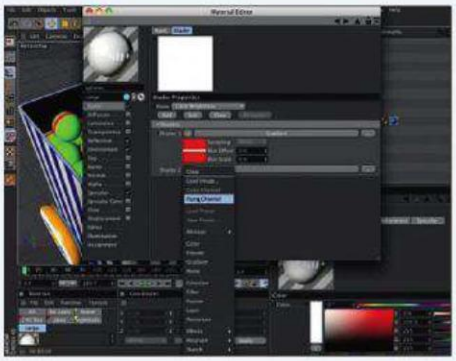
### 20 Texture the eightball

Now drag the eightball material onto the Sphere. In the Attribute Manager, change Projection to Flat, untick Tile and set Side to Front. Switch to the Use Texture Axis Tool. Select the Scale Tool and scale the texture until you have the number eight nicely positioned on the Sphere. In the Object Manager, select Tags > Cinema 4D Tags > Stick Texture.

# STAGE FIVE

## Texturing the cargo

**Right now, the cargo spheres have the same striped material as the vehicle, so let's change that. You'll start by importing an already created material and manipulate that to get a two-coloured shader: a base colour with a different-coloured stripe. To accomplish this, you'll create several regular gradients inside a MoGraph Multi Shader: thanks to the Random Effector you added in step 9, Cinema 4D will assign each gradient you create to a sphere in the cargo Cloner.**



### 24 Load a material

Unhide the Lid in the Object Manager and position the viewport so you can see the cargo spheres. Using the Material Manager, load dyn_mats2.c4d from the project files and assign the material in the cargo material layer to the original Sphere in the cargo Cloner. Keep Projection as UVW Mapping. Double-click the material in the Material Manager to open the Material Editor.

### 25 Create a multi-shader

Select the Color channel and click on the thumbnail for Multi Shader. Click the arrow next to Shader 1 and select Copy Channel from the menu that appears. Click the arrow next to Shader 2 and choose Paste Channel. Click the new thumbnail to access the gradient's properties and change the colours to whatever suits your mood.

### 28 Animate the camera

Position the Camera so it's pretty low and close to the ground, looking almost straight on the eightballs. Make sure the timeline is at frame 0 and that the Camera is selected. In the Camera's Attributes, select the Coordinates tab and set a keyframe for the Camera's Y position. Scrub to frame 140, then move the camera up in Y so you have a good view of what's going on. The easiest way to do this is probably to select View > All Views in the viewport, then move the Camera in one of the orthographic viewports. When you've found a good position, add a new keyframe to the Camera's Position Y setting. And with that, you're done. Unhide the Scene group, scrub back to frame 0 and press Play to watch the new dynamics capability of Cinema 4D R12 in action.

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# Create effective VFX in games

## Game artist **Farhan Qureshi** provides expert advice for making the most of effects in game level development

Creating in-game effects is a delicate balance between perceived realism and what's technically feasible. Done properly, effects make a game feel immersive and highlight gameplay elements in a way that goes undetected by the player. Here, I'll pass on tips that will help you to raise the bar for game effects by making them stand out, while still allowing for limitations in real game development engines.

We'll also see how certain attributes can be adjusted and when they should be traded off against changes in other areas to achieve various looks. Throughout, I'm assuming you know the basics of particle systems and how to manipulate them.

We'll be looking at ways to keep memory and performance issues in mind, constraining particle counts, adjusting life spans and how opacities may reduce overdraw issues.

Illustrated with images from Splash Damage's upcoming Brink (**brinkthegame.com**), the tips range from how junior artists can make in-game effects that will gain approval and building a library of multi-purpose emitters, through to the things experienced VFX artists moving from film into games will want to think about. I'll also look at a few issues that the VFX artist needs to consider when interacting with other departments, from animation to environment, sound and GUI.

**About the author**
Farhan Qureshi has created effects for three Harry Potter films, and is currently leading the VFX on Splash Damage's Brink for Xbox 360, PS3 and PC
splashdamage.com

Splash Damage's forthcoming Brink is a masterclass in effects design

## 01 Understand effects

If you're able to step frame-by-frame through a Hollywood feature film effect, you'll pretty much see how the pros set up an explosion. It's useful to do the same with games to see how other artists have approached an effect – but be careful with either of these, because you risk your effects becoming derivative.

Break the reference into its constituent elements, then translate these into the attributes and primitives you have in your software. For example, you could translate a shockwave as a torus-shaped emitter shooting out particles in a radial direction; adding drag and increasing the scale will slow these down and create a bloom as the wave settles. Combine these with a drop in opacity and added rotation, and they'll fade out in a wispy manner.

## 02 Organise your chaos

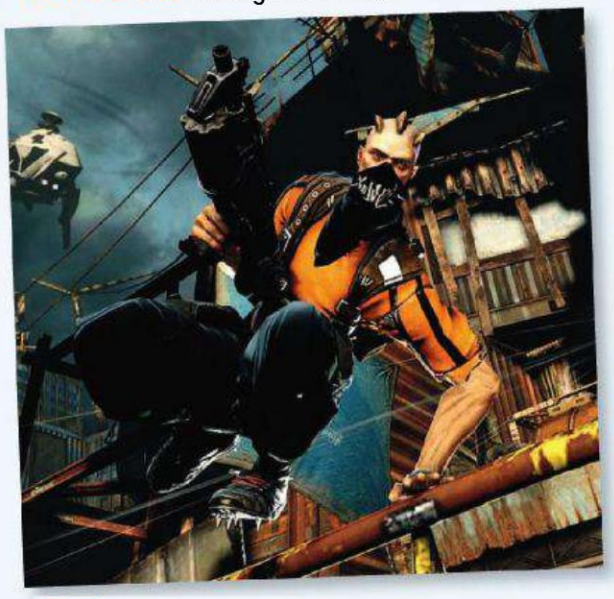
You want to excite people during high-intensity firefights with plenty of impacts , but throwing in lots of fire and spark sprites with high velocities may confuse and disorientate players. Instead, combine bright spark and fire textures with high incandescence set to a short lifespan. Moving large numbers of small elements – such as blood dots, debris and sparks – quickly and with diminishing scales gives a violent effect without adversely reducing frame rates.

Use highly opaque smoke textures to punch out from the fire and create follow-through. Consider how many instances an effect will be played over, then dissipate the effect appropriately. Knowing the rate of fire for a particular weapon will serve as a guide. Having multiple instances of slow-settling smoke undoubtedly looks cool, but it may also grind the frame rates to a complete halt.

## 03 Make your effects all-encompassing

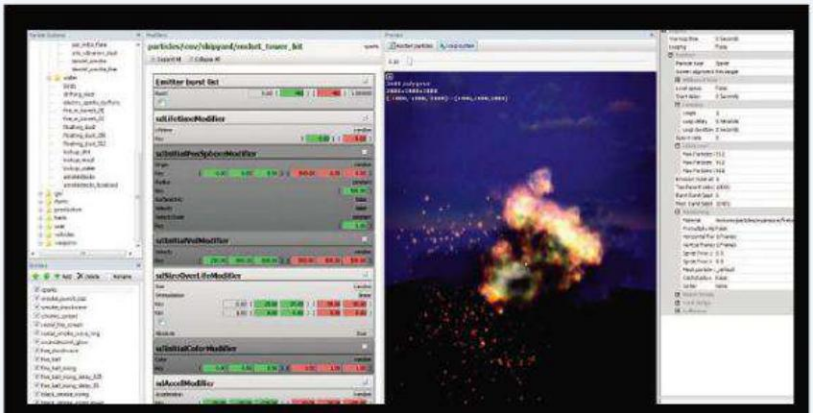
Does it make sense to have blood and gore flying out of a player when their animation doesn't flinch? Does shrouding an object in fire and smoke look appropriate when the object itself remains unscathed? Consider how appropriate the effect is in-game. If a certain calibre of bullet leads to an animation of an enemy being floored and incapacitated, the blood effect should be several times bigger than a lower-calibre bullet injuring an enemy.

When blowing up items, see if you can tweak the timings for switching between damaged and undamaged states – particle effects have to cover this model swap from the player. Check whether physics can also be applied to items, and what the corresponding performance hit would be. Effects have to work in conjunction with animation and sound, so consult with these departments to ensure you're all working to the same goal. »



## 04 Find contrast in the environment

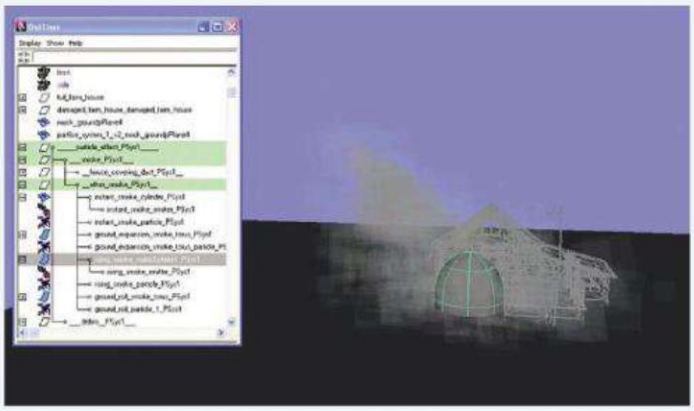
Talk to your art director about creating level-specific effects. Study the colour wheel to create colour relationships (monochromatic, complementary, analogous and so on) and contrasting movements, developing signature effects for each level. Find necessary gameplay beats that motivate a level-specific effect.



## 05 Create now, optimise later

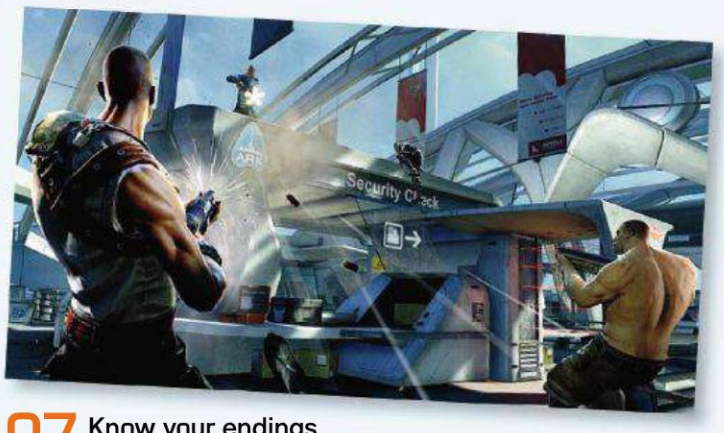
Creating and optimising simultaneously doesn't achieve either goal. While it's important to bear in mind the memory and performance issues your effects may have, paying too much attention to these at the outset leads to a compromised set of results. Focus on the effect first. Once you've established what the most important effects are, start a subtractive process on redundant emitters. This leads to a more creative solution.

Discuss rendering options with your programmers so you can keep more particles on-screen. Optimise by trading off particle counts against higher opacities; trading off longer lifespan against scale can reduce overdraw. Soon you'll have an optimised library of emitters and textures to draw upon, so you can focus on the creation aspect; it's easier to dial back than to add in.



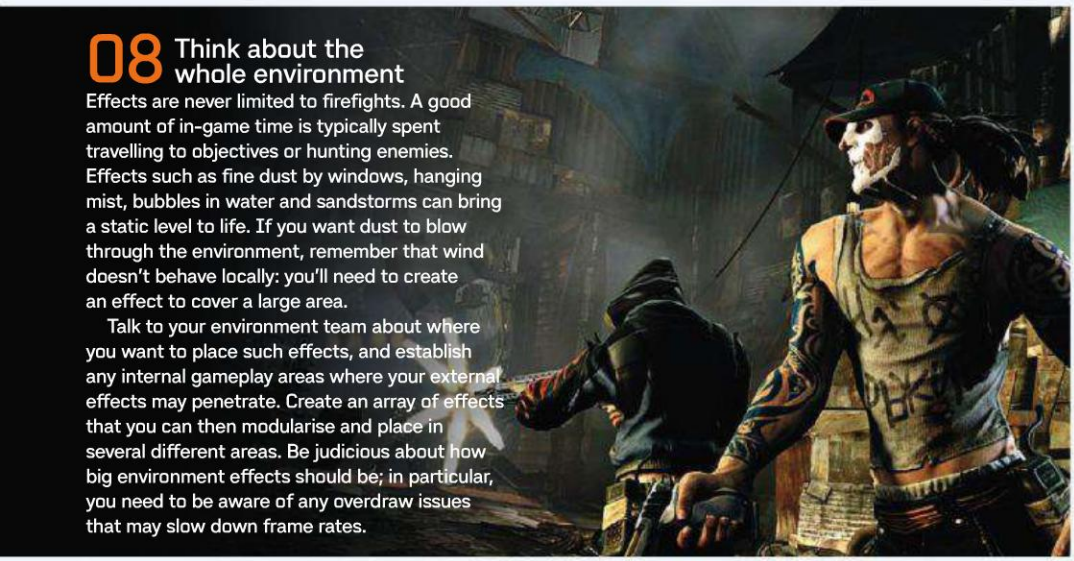
## 06 Add delays for extra punch

Not everything has to happen at once. Build in time offsets to create additional punches of energy. Think in terms of a primary explosion and secondary reaction or cook-off effect, where fuel stores may ignite a split-second later.



## 07 Know your endings

Effects must disappear correctly. Fading opacity over time is rarely acceptable on its own. When working with large elements such as smoke, slow down the velocity and increase the scale. Use gravity to send smaller elements and debris in the opposite direction, and scale down when they strike the floor.



## 08 Think about the whole environment

Effects are never limited to firefights. A good amount of in-game time is typically spent travelling to objectives or hunting enemies. Effects such as fine dust by windows, hanging mist, bubbles in water and sandstorms can bring a static level to life. If you want dust to blow through the environment, remember that wind doesn't behave locally: you'll need to create an effect to cover a large area.

Talk to your environment team about where you want to place such effects, and establish any internal gameplay areas where your external effects may penetrate. Create an array of effects that you can then modularise and place in several different areas. Be judicious about how big environment effects should be; in particular, you need to be aware of any overdraw issues that may slow down frame rates.

## 09 Go beyond particles

Take particles further with the use of lighting on any firearm muzzle and fire effects. Similarly, physics-based rigid body simulations will add a lot more weight and realism to objects being knocked over. When the player is on the receiving end of a particularly nasty shot, adding camera shake, vignettes and post effects can augment a particle solution.

## 10 Adapt to game effects from film

Work around the lack of renderfarms, fluid solvers and long simulation times available in feature film production by staggering emitters and putting bigger, brighter elements first. Kill particles earlier, then add secondary motion to compensate. Your effects must work from any angle, but remember that players will be moving and reacting to big explosions.

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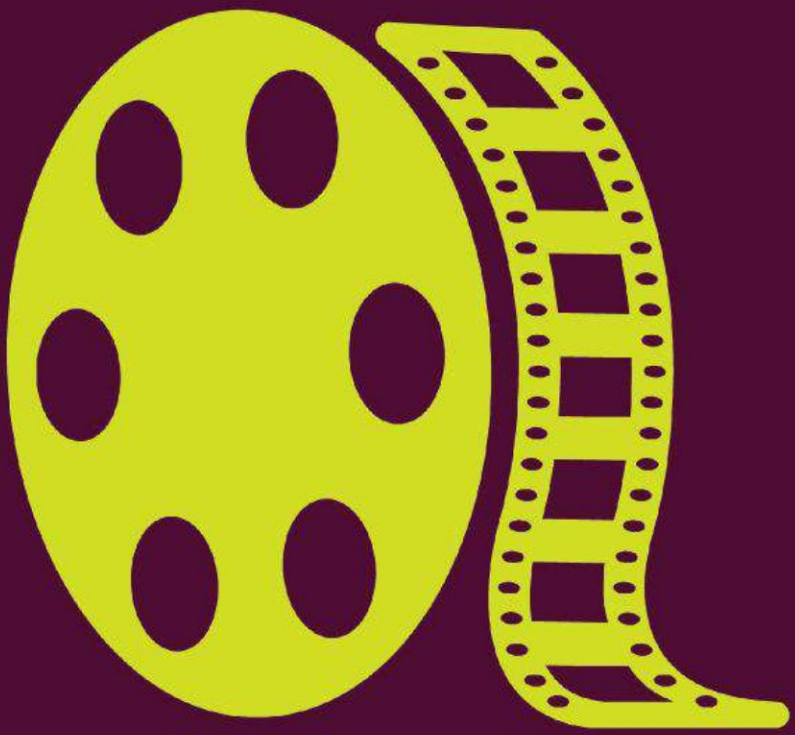

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Combining a sun light, your program's sky system and a well-considered bounced light scheme yields convincing exterior results

Scene features Zhi Da He Ti Yu Guan by YD Studio2

# The great outdoors

**PART 4 Michael McCarthy continues his series on lighting by showing how to create a system to illuminate exterior scenes**

You should always consider the major basic elements when setting up exterior lighting for a 3D scene. Whether it's for games, film or architecture, you always need a sun, the sky and bounced light. When you lit an interior scene in our previous instalment (last issue), you added global bounced and local lights to enhance certain areas. For an outside scene, there will be much more bounced light. Sunlight bounces off every surface, illuminating even small indirect areas.

The first thing to set up is the sky. Many 3D packages include a sky system, or you can use a Physical Sky shader. Each is different in its details and parameters. In my video tutorial, I set up a simple dome with a sky texture mapped to it. This technique works well whether you're using 3ds Max, Maya or Softimage. The dome can be a squashed hemisphere, with flipped normals to project into the environment. You can use HDR images for more reflection and detail, or basic ones to map a texture to the dome.

In either case, it's best to have a panoramic image with good tiling at the top, so you don't see a pinch where it comes together. In the video tutorial, you'll see how I blend a sky texture with a procedural gradient map to give a little more control.

Next, set up the sun. Use a Direct or Infinite light: the sun doesn't have a cone like a spotlight, and you want it to encompass your whole scene. Adjust your falloff to achieve this effect. Use raytraced shadows: they allow for fine details and crisp edges. Shadows from the sun are usually pretty well-defined.

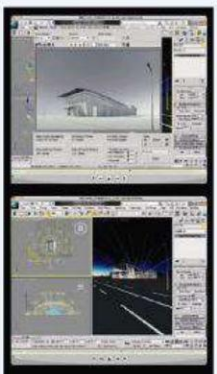
The sun is the key light in the scene, contributing the most light and colour. Changing the sun colour can alter the mood or time of day dramatically: a warm pink suggests a sunset, while a cool blue takes your shot into the evening or gives it a wintry feel.

Next, you need some bounced light. It can be difficult to position a few Omni lights, since bounced light is everywhere. Most sky systems include a component of ambient light or basic global illumination. In the video, I create a Dome Light setup, which emulates soft bounced light coming from every direction. You need to distribute many low-illumination lights with soft shadows and wide falloff values around a dome shape. When creating these lights, set them all up as instances and on a layer, so you can easily select and hide them, and adjust the value, colour and shadow samples of one to affect them all. This way, if you want to tint the scene with a little blue or yellow, you can introduce some of that colour in the bounce light.

If your shadows and falloff values are well-tuned, you should have fast render times without flickering – and by combining a direct sun light with a dome setup, you'll start to get realistic results.

*The scene files for this tutorial include the model Zhi Da He Ti Yu Guan by YD Studio2, provided courtesy of TurboSquid (**turbosquid.com**). This model may not be used other than with this tutorial. For a commercial licence and details of other models by the artist, visit **turbosquid.com/Search/Artists/YD-studio2***

**Next issue: Part 5**
**Michael explores the differences between lighting daytime and night-time scenes**



**WATCH THE VIDEO TUTORIAL**
Set up a dome-based exterior lighting scheme in 3ds Max with Michael's video on our website **3dworldmag.com/140**

**About the author**
Michael McCarthy is an experienced 3D artist working in broadcast, feature film and games. He's an Autodesk Certified Instructor and has given masterclasses at SIGGRAPH 2010 and End User Event 2010
mmccarthy.com

Step-by-step Blender Games

**FOR**
Blender 2.5

**TIME TAKEN**
One hour

**TOPICS COVERED**
- Logic Bricks
- Faking a volumetric light effect
- UV mapping
- Post-processing

**ON THE DISC**
- Scene files
- Screenshots

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- Screen-capture videos

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# Breathe life into a game level

## You've created a gorgeous environment, but it's still lacking something. Christopher Plush shows you how to add atmosphere without taxing your game engine

It's been a proof-of-concept device, a prototyping tool, a diamond in the rough… Blender's game engine has seen more development action in the past few years than even its most hardcore advocates had expected or hoped to see. What was once left for dead has been refuelled, repaired and practically reinvented, to the delight of Blender old hands as well as the droves of new hobbyists and professionals looking for an easy and fast tool for real-time work.

In this tutorial, I'll focus on finalising a scene for Blender's game engine. I'll show you how to polish it up with extra details, crucial for making the level look and feel complete, in order to pull the player completely into the world you've created. You'll use Blender 2.5, which is still in beta at the time of going to press, but set for a final release shortly. These techniques add sophisticated effects without the processing overhead associated with more complex lighting schemes, which would be the obvious path to take.

What's a run-down zombie warehouse without rain (or blood) dripping from the rafters? You'll start off making an object that adds dripping water randomly, and then place this all around the warehouse. Next, you'll create effects focused on lighting, simulating volumetric moonlight then adding a glow effect around the hanging lamps. To enhance the environment further and make every element mesh together seamlessly, you'll add post-processing filters for depth of field and HDR.

This warehouse scene was the product of a video tutorial DVD I made for cgmasters.net. All of the models and textures within these source files are released under the Creative Commons Attribution 3.0 licence, the most liberal licence out there. Use them however you like. But first, we should finish the level – so let's get started…

**The scene files for this project use scripts provided courtesy of Martins Upitis (artmartinsh.blogspot.com).** »

**About the author**
Christopher Plush is a designer for gimmedesign.com and co-owner of the 3D training website cgmasters.net. For his training site, he recently worked on a video tutorial DVD on creating the warehouse featured in this tutorial cgmasters.net

Transform this games level in one hour

Enrich your scene in a way that isn't overly intensive by simulating volumetric lighting



**WATCH THE VIDEO TUTORIAL**

Follow the entire workflow for adding atmospheric detail to your game levels with Christopher Plush's videos

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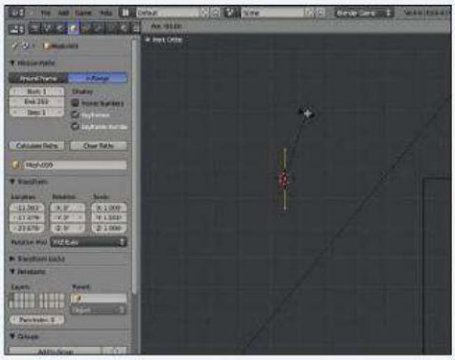
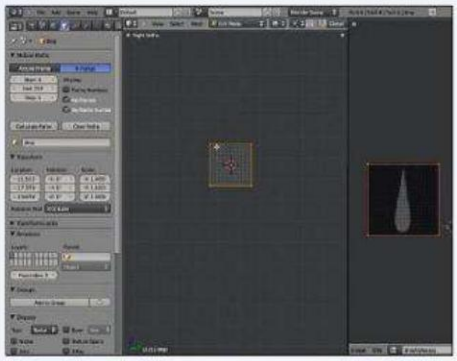
# STAGE ONE

## Dripping water

**To make the level more immersive, extra details such as dripping rain – or blood, if you prefer – are essential for making the environment feel whole. Here, you're going to set up a game element that adds dripping water from an Empty object at random intervals. This Empty object can then be duplicated all around the environment. The water drop is a texture that's UV-mapped to a plane: this will always track the camera on the Z axis, making it seem like it's three-dimensional. Work in warehouseStage1.blend from this tutorial's project files.**



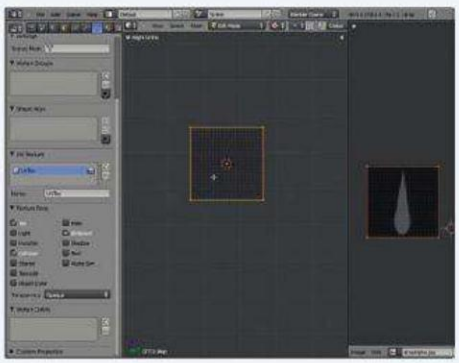


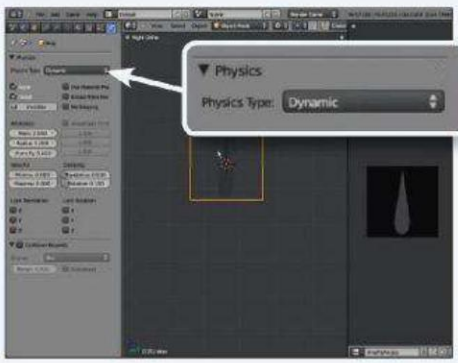
### 01 Create a waterdrop object

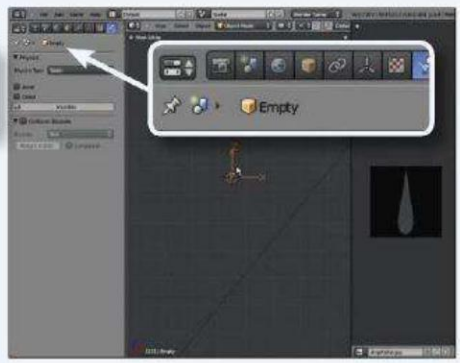
In Top view, select Add > Mesh > Plane. Next, in Front view, switch to Edit Mode, then press [R] and rotate the mesh anti-clockwise by 90 degrees. (Hold [Ctrl] to rotate in fixed increments.) Later, you'll force this plane to track the camera on the Z axis. If it's to display properly, it has to be aligned to be perpendicular to the X axis, facing in the negative X direction.

### 02 Unwrap the plane

In Properties' Object tab, change the plane's name to **drop**. In Right view with all vertices selected, press [U] for UV Mapping options and select Project From View (Bounds). In the UV/Image Editor, click the icon to the left of New and select dropAlpha.jpg from the list to load it. (It's embedded in the warehouseStage1 scene file.)






### 06 Texture Face panel

Select Properties' Object Data tab, then switch to Edit Mode to make the Texture Face panel visible. With all vertices selected, enable Billboard. This forces the plane to track the camera on the Z axis so it's always facing you, hiding the fact that it's only two-dimensional. (This is why you aligned the plane in a specific way in step 1.)

### 07 Physics settings

In the Physics tab, change Physics Type to Dynamic so the object can have motion, and enable Ghost so that characters can walk through it without collision. In Object Mode, move this object to the last layer. (Press [M] to show the layers.) For this technique to work, the object needs to be in an inactive layer when the game starts.

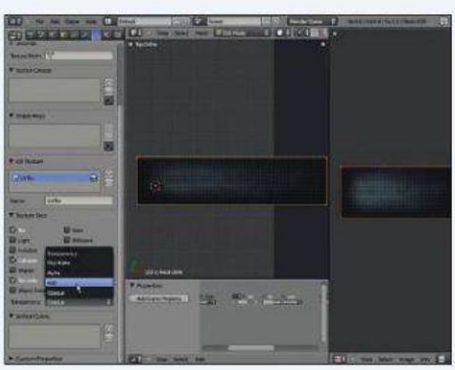
### 08 Create an emitter

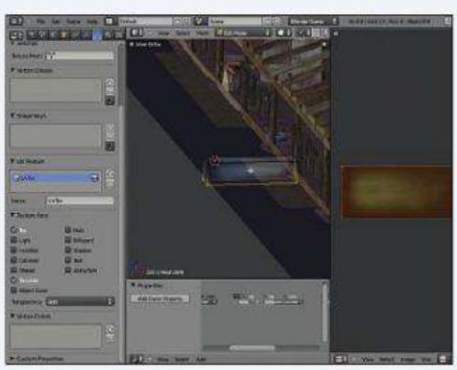
In Top view, select Add > Empty. This is the object that's going to be adding instances of the water drop at random intervals. Split the 3D View horizontally by dragging the diagonal lines in the viewport's top-right corner straight down. Change the bottom window to the Logic Editor.

# STAGE TWO

## Volumetric lighting

**A warehouse is typically a dusty environment, so now you're going to simulate rays of lighting shining through the windows, as if moonlight coming in was reflecting off all the particles in the air. You'll be faking volumetric light by setting up a few planes with a ray texture UV-mapped to them. Instead of using single planes to display the ray texture, you'll make an open-ended box object with light rays UV-mapped to each side, giving an illusion of volume. You can continue with your edited scene file or open warehouseStage2.blend.**



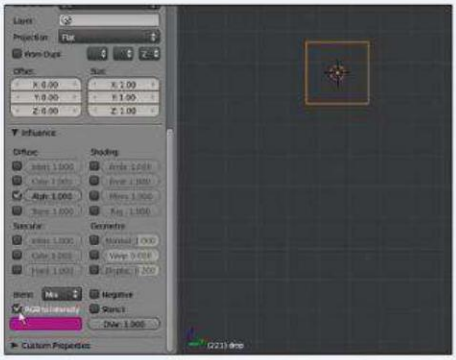


### 11 Stretch a plane

In Top view, add a Plane. In Edit Mode, stretch the mesh to 2.5 units wide by 10 units long. With the whole Plane selected, press [U] and select Project From View (Bounds). Load raysCol.jpg. You'll see the ray texture on the mesh in Solid mode [Z]. With this face selected, choose Properties' Object Data tab. Enable Two-side in the Texture Face panel. Change Transparency to Add and disable Collision.

### 12 Create a funnel

In Front view with all vertices selected, press [E] and extrude down by 2.5 units. Delete the faces at each end of the box so that it's open-ended. You're creating this as a box instead of individual planes to establish the illusion of volume. The rays will be very transparent, so you'll be able to hide the box shape. If you were using a more opaque texture, this would be more difficult.


## 03 Add a material and texture

Switch to Object Mode. In Properties' Material tab, add a new material and name it **waterdrop**. Change the Diffuse colour to a dark grey and enable Shadeless. In the Texture tab, add a new texture; name it **dropAlpha** to correlate to the image texture you'll load into it. Change Type to Image Or Movie. In the Image panel, load dropAlpha.jpg via the Browse Image pop-up menu.

## 04 Texture settings

In the Mapping panel, change Coordinates to UV so the image is displayed on the object based on the UV layout. In the Influence panel, disable Color and enable Alpha. Once you've set up the material, playing with this Alpha value will enable you to make the drop more transparent. Next, enable RGB to Intensity, which converts RGB values to intensity values so the image can be used as an alpha map.

## 05 Enable Blender Game controls

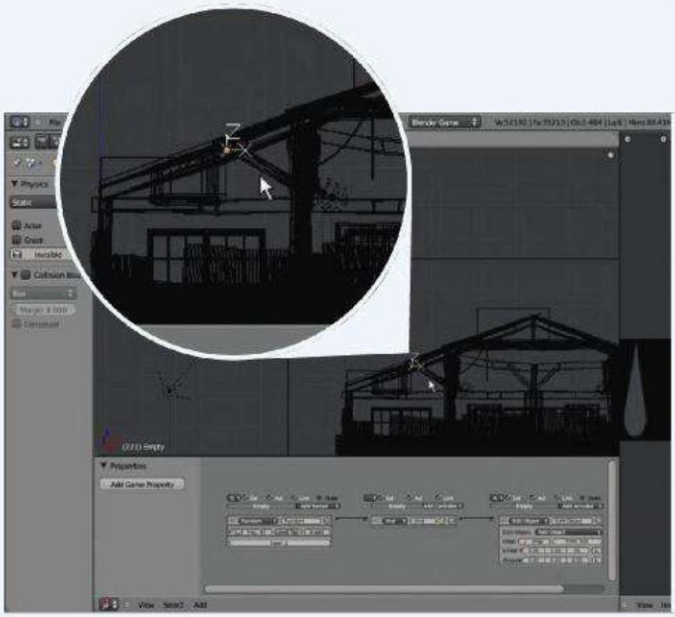
In the Material tab, enable Transparency and take Alpha down to 0. Press [Alt]+[Z] for the Textured display mode: you should see the water drop displaying faintly. In Blender's main menu bar, make sure Blender Game is enabled instead of Blender Render. This enables controls specific to the Blender Game Engine in certain areas.

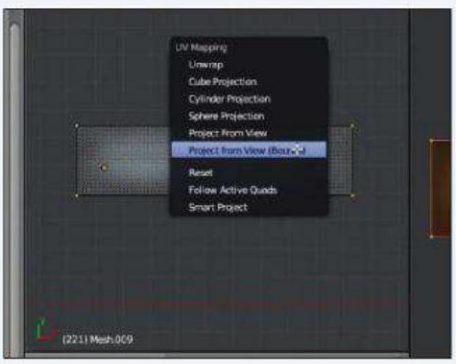
## 09 Add Logic Bricks

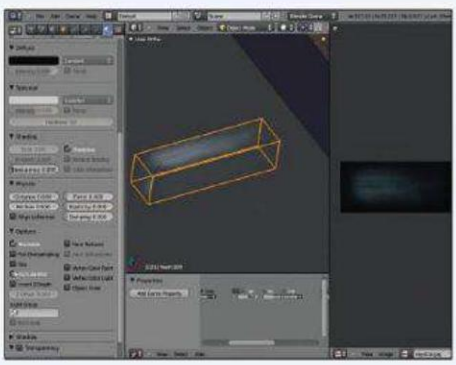
Click Add Sensor and select Random. Change Freq to 40 (or more for longer intervals) and Seed to 1. Click Add Controller and select And. Click And's left-hand dot and drag it onto Random's right dot to connect the two. Click Add Actuator and select Edit Object. The default type for this actuator is Add Object, which is what you want. Click the Object field and select drop.

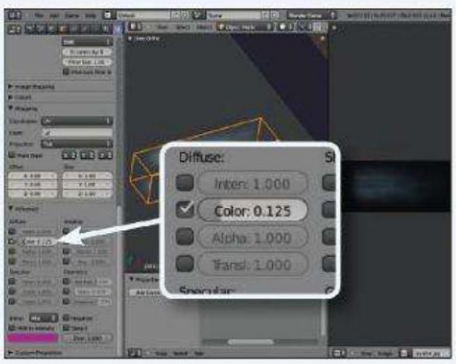
## 10 Complete the droplets

Time defines the lifespan of the added object. Change it to 300. Now set Linear Velocity's Z value to -30.0: this gives the object an initial downward velocity when it's added. Next, connect the actuator to the controller. Duplicate the Empty, placing the copies in groups among the rafters, and then change the Seed value for each one. You can play with the material and drop size settings while testing it in-game. (Press [P] for testing.)








## 13 Fix the UVs

Each new face created from the extrusion will display the ray texture, since the new faces inherit the original face's UV coordinates. However, a couple of faces may be displaying it incorrectly. Re-unwrap each of those so that the texture is displaying in the same direction on every face – see the Stage 2 video for help.

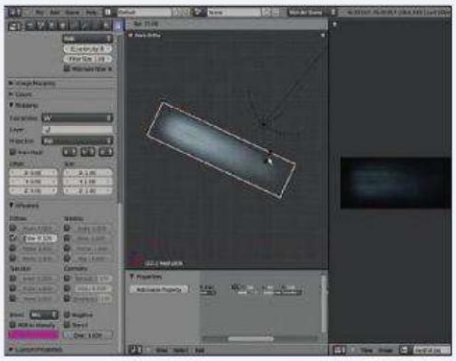
## 14 Select a material and texture

In Properties' Material tab, add a new material and name it **rays**. In the Shading panel, enable Shadeless. Since this is light, you don't want it to be affected by other light. Change Diffuse to black, and disable Use Mist in the Options panel. In the Texture tab, add a new texture and name it **rayCol**. Change Type to Image Or Movie and load rayCol.jpg.

## 15 Texture settings

In the Mapping panel, change Coordinates to UV. In the Influence panel, change Color to 0.125. The original texture is too opaque, but lowering the Color value fixes this: it makes it more transparent since the Transparency type of the faces is Add rather than Alpha. This is also why you changed the Diffuse colour to black.

»

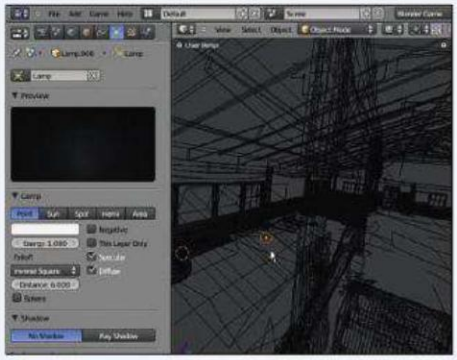


## 16 Rotate the object

In Object Mode and Front view, rotate the object clockwise by 25 degrees, so the light will be shining towards the ground. There's one dark section in the environment (middle-left when seen in Top view) where there's no lamp. This is where you'll have some light shining in through the windows.

## 17 Position the light objects

There are four windows here, so position the ray object in front of one window and press [Shift]+[D] three times to duplicate it for the others. Try not to make the objects intersect with the ground or anything else: any intersection will make it obvious that the light isn't actually volumetric.



## 18 Add moonlight

The last step is to create extra illumination caused by the moonlight shining in. Select Add > Lamp > Point, then click Properties' Object Data tab. In the Lamp panel, change Distance to 6. The shorter range prevents the moonlight from illuminating objects too far outside this area. Move this lamp close to the ground in the centre of this space.

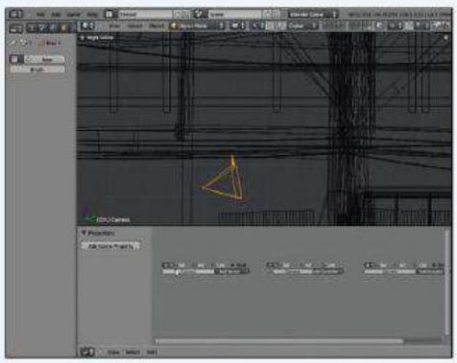
## 21 Add a material and texture

Next, add a new material called **glow**. As you did in step 14, enable Shadeless and disable Use Mist. Add a texture called glowCol; change Type to Image Or Movie and load glowCol.jpg. In the Mapping panel, change Coordinates to UV. In Object Mode, make a duplicate of this flare for every hanging lamp and position each at the bulb.

# STAGE FOUR

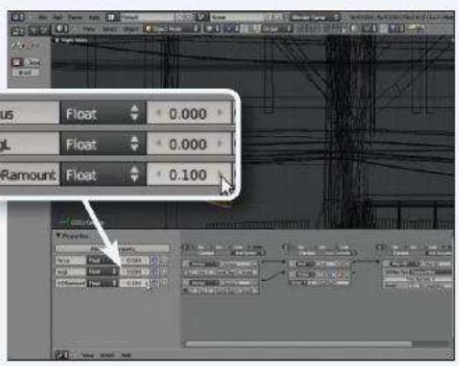
### Post-processing

**Post-processing helps you bring everything together to achieve the final look for your scene. Here, you'll use filters for depth of field and HDR to polish up your finished product. To do this, you'll attach multiple scripts to an object in the scene using the Logic Editor. You'll add a web of Logic Bricks that will run the necessary scripts. These scripts are included in the warehouseStage4.blend file and are provided courtesy of Martins Upitis (artmartinsh.blogspot.com).**



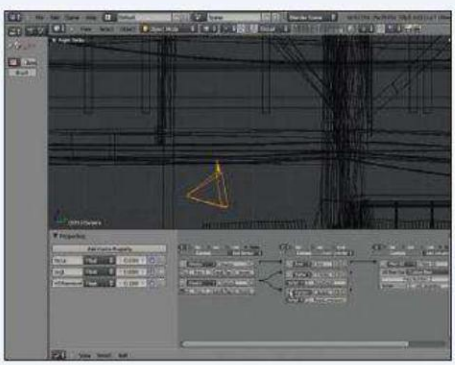
## 22 Choose a host

To add depth of field to your scene, you need to attach two scripts to an object in the scene. You can select any object in principle, although it's good to have one object dedicated to running scene scripts. I usually choose the Camera. Select the Camera and then change one of the editing windows to the Logic Editor (if you didn't already do that for the water drip stage).



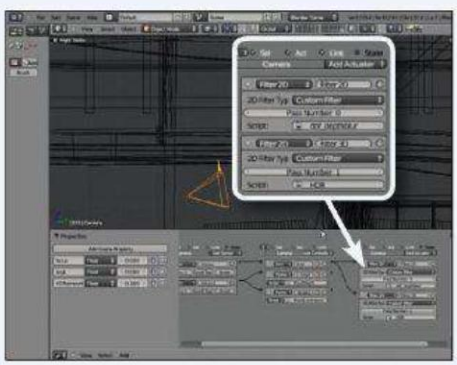

## 26 Add an HDR filter

Just like adding the depth-of-field filter, you need two scripts for the HDR filter. Select the same object to which you attached the depth-of-field scripts (the Camera, for example). In the Logic Editor's left-hand panel, add two new Game Properties: **avgL** and **HDRamount**. The HDRamount property controls the influence this filter has on the scene: give it a value of 0.1.



## 27 Another Python controller

Add a Python Script controller and set Script to ReadLuminance. Connect this controller to the lower Always sensor, which is already connected to the first Python Script controller.



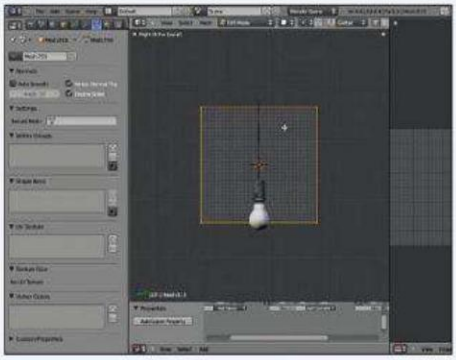
## 28 Another Filter actuator

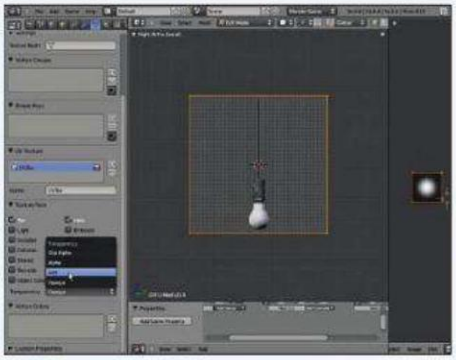
Add a Filter 2D actuator. Change 2D Filter Type to Custom Filter, then set Script to HDR. Change Pass Number to 1, otherwise it will override the depth-of-field filter. Link it to the And controller you created earlier.

# STAGE THREE

## Lamp glow

To make all the hanging lamps really feel like they're part of the scene, you're going to add a little glow around them, using planes and a glow texture. For the planes, you'll use settings in the Texture Face Panel to make them track the camera. This time, they'll be tracking the camera in three dimensions, so you'll use the Halo setting instead of Billboard.



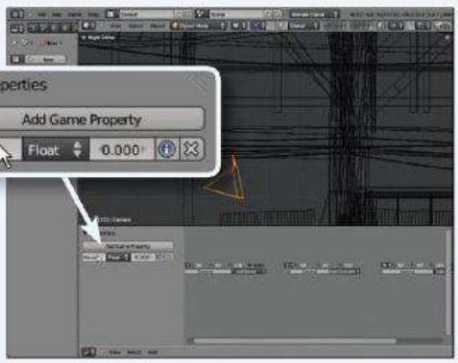


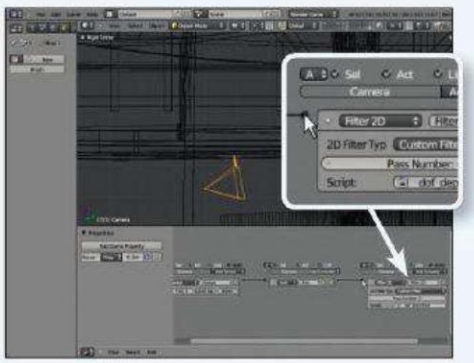
### 19 Create a glow plane

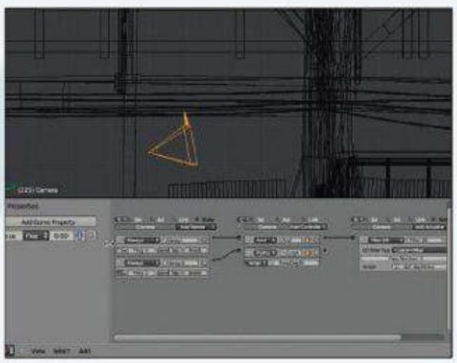
Select one of the hanging lights and switch to Local view by pressing [Numpad /]. In Top view, add a Plane and align the mesh exactly as you did for the waterdrops in the first stage. Here, you'll use a similar feature to Billboard called Halo, which tracks the camera on every axis rather than just Z.

### 20 Set it up

Resize the Plane to be as big as you want the glow to be. UV-unwrap it and load glowCol.jpg in the UV/Image Editor. With the face still selected, go to Properties' Object Data tab; in the Texture Face panel, disable Collision, enable Halo and change Transparency to Add.



### 23 Add a Game Property

On the left-hand side of the Logic Editor is an area to add properties to your objects. Here, you need to add a Game Property called **focus**. Its default property type is Float, which is what you want. This will be used by the ReadDepth script to constantly find the focal point and adjust how the depth-of-field effect is applied.

### 24 Filter 2D actuator

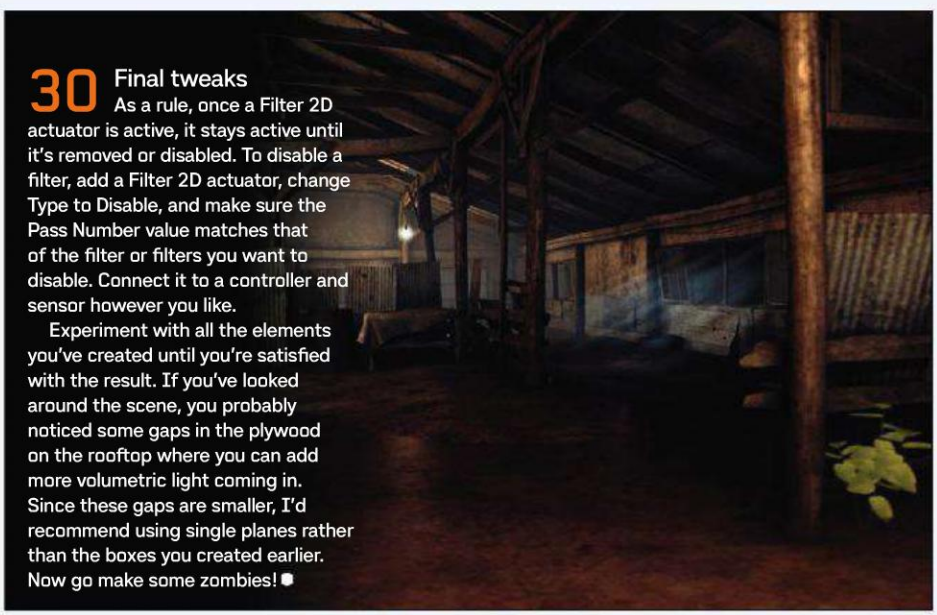
Add an Always sensor: connect it to an And controller, and connect that to a Filter 2D actuator. In the actuator options, change 2D Filter Type to Custom Filter, then click the Script field and choose dof_depthblur. You only need this script to run once, so make sure True Pulse (the left-most toggle button in the sensor) is turned off. It's off by default in Blender 2.5, so you shouldn't have to worry about it.

### 25 Connect a Python controller

Add another Always sensor, this time enabling True Pulse. Connect this to a Python Script controller, and set the controller's Script to ReadDepth. Instead of using an Always sensor to trigger the depth-of-field filter, you can use other sensors as well: a script could be triggered by an event such as a real-time cut-scene, for example.

### 29 Optimise the logic

For these filters, there are multiple scripts running at all times. To save on resources, you can create conditions in the Logic Bricks to prevent the scripts from running when they're not in use. Instead of using an Always sensor, for example, it could be a Property sensor set to run these scripts when a given property is a certain value, enabling you to turn the Python controllers on and off.



### 30 Final tweaks

As a rule, once a Filter 2D actuator is active, it stays active until it's removed or disabled. To disable a filter, add a Filter 2D actuator, change Type to Disable, and make sure the Pass Number value matches that of the filter or filters you want to disable. Connect it to a controller and sensor however you like.

Experiment with all the elements you've created until you're satisfied with the result. If you've looked around the scene, you probably noticed some gaps in the plywood on the rooftop where you can add more volumetric light coming in. Since these gaps are smaller, I'd recommend using single planes rather than the boxes you created earlier. Now go make some zombies!

# Questions & Answers

## Your software queries solved by experts

### Find the supporting files

Visit the 3D World website for all the assets you need to follow each Q&A

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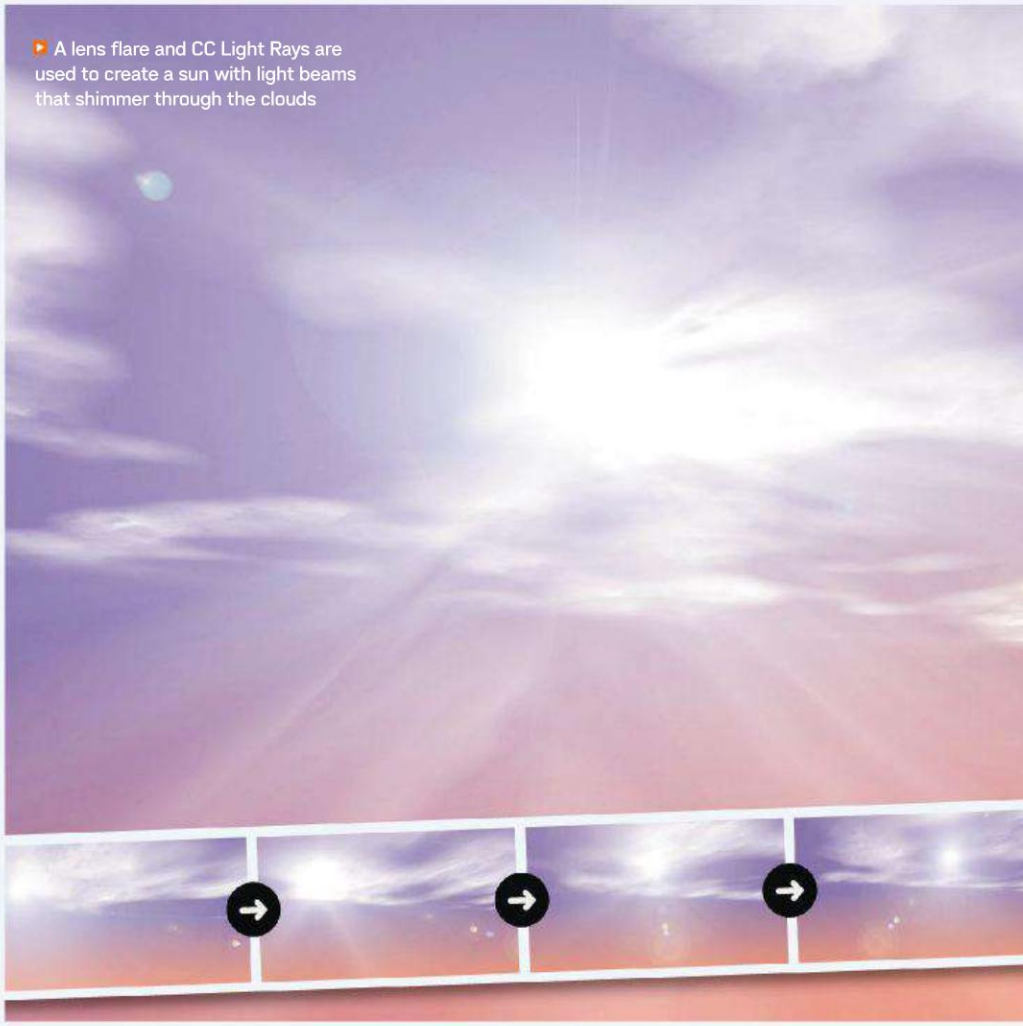

A lens flare and CC Light Rays are used to create a sun with light beams that shimmer through the clouds

**WATCH THE VIDEOS**

**Most Q&As in this issue include a video showing the workflow**

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## After Effects

## "How can I create a time-lapse cloud movie sequence?"

**Adrian Kelsey, via email**

### Andy Davenport replies:

Start off this task by selecting Composition > New Composition in a new project. Name the Composition **Clouds**. Set Preset to PAL D1/DV Widescreen Square Pixel and Duration to 0:00:10:00. Select Layer > New > Solid. Call it **Cloud Texture**, then click Make Comp Size followed by OK.

On this layer, add Effect > Noise & Grain > Fractal Noise. Change Fractal Type to Subscale, Noise Type to Spline and Contrast to 177.0. Click the arrow next to Transform to reveal its settings. Now untick Uniform Scaling and change Scale Height to 158.0. Click the stopwatch next to Offset Turbulence to create a keyframe, then go to the last frame on the Timeline and change the settings to 512.0, -533.0. Now click the stopwatch next to Evolution and set it to 2x +0.0°, then go back to the first frame and set it to 0x +0.0°.

Duplicate the layer via Edit > Duplicate, then press [Enter] and rename it **Cloud Matte**. In this layer's Fractal Noise settings, change Fractal Type to Basic, Noise Type to Soft Linear, Contrast to 400.0, Brightness to -20.0, and Complexity to 3.0. In the Transform settings, enable Uniform Scaling and change Scale to 250.0.

Next, draw a mask that covers approximately the bottom fifth of the Cloud Matte layer. Set its mode to Subtract. Press [F] to reveal Mask Feather; disable Constrain Proportions via its chain icon and set the amount to 0.0, 50.0 pixels. If it's not already revealed, expand the Transfer Controls Pane (middle button, bottom-left) and change the Cloud Texture layer's Track Matte to Luma Matte "Cloud Matte".

Create a new Composition with the same settings as before. This time, call it **Clouds 3D**. Drag the Clouds Comp from the Project panel into the Clouds 3D Timeline and click the blank box under the cube icon to make it a 3D Layer. (Click Toggle Switches/Mode if the setting isn't visible.) Press [R] to reveal its Rotation properties and change X Rotation to 0x +90.0°. Now select Layer > New > Camera, select the 28mm preset and press OK.

The next steps are a matter of personal preference and don't need to be exact. Use the Orbit Camera Tool to position the Camera so it looks up and a little to the side of the Clouds layer, then adjust the Clouds layer's Position and Scale settings to fill the top half of the screen. (You can use the screenshot above as a guide.)

Now select the Clouds layer and add Effect > Distort > Displacement Map. Use Luminance for both Horizontal and Vertical Displacement, and set both Max Displacement settings to -20.0.

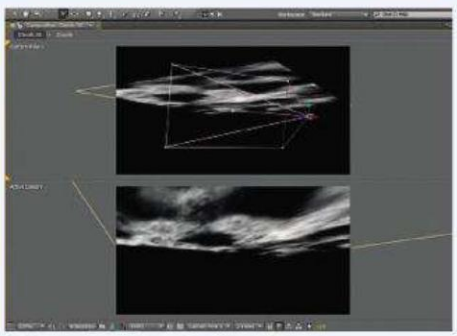
Create a new Comp called Final and drag Clouds 3D into it. Create a new Solid; call it **Sky** and drag it under the Clouds 3D layer. Add Effect > Generate >

### Send us a question

No matter which 3D software package you use, our experts are here to help. Send your questions to the email address below and we'll try to find a solution. Include your scene file (no larger than 5MB in size, please) if it helps to illustrate the problem

qa@3dworldmag.com

**Expert tip**
Use an expression to link the light rays to the lens flare for easier animation. The accompanying video shows you how

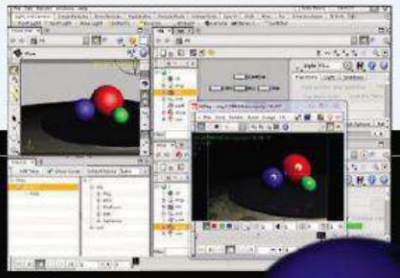


Position the camera and then adjust the scale and position of the clouds until you get an angle that you're happy with for the scene

Ramp. Change Start Color to R 123, G 120, B 171 and End Color to R 224, G 138, B 124. Change Start of Ramp to 525.0, 302.0, then select the Clouds 3D layer and set its blending mode to Screen.

Finally, add Effect > Generate > Lens Flare to the Sky layer. Change Flare Center to 930.0, 184.4 and Lens Type to 105mm Prime. On the Clouds 3D layer, add Effect > Generate > CC Light Rays. Position the Center indicator over the lens flare, then change Radius to 180.0 and Warp Softness to 20.0.

**Andy Davenport is a motion graphics artist, 3D animator and compositor for UK-based studio Mediastation**
mediastation.co.uk



By grouping the RGB take inside the Beauty take, it inherits the properties of its parent



**Expert tip**
To composite images, use the Image desktop (Window > Desktop > Image). Go inside comp1 and fine tune it with Subtracts, Adds and Multiplies

Setting up this render using takes gives you more flexibility when it comes to comping

# Houdini
# "How do I set up three-point RGB lighting in takes?"

## Roslyn Bauyon, from the forums

### Carlos Donis Lemus replies:

The key feature of takes is that you can set up an initial render pass, then pass that data down to the next take. Load up Houdini_RGB_Lighting_with_Takes_start.hip from this Q&A's project files. Right-click the Material Palette label in the bottom-left and select Take List from the menu that appears.

I've set up takes labelled Beauty and ip for you. Select the ip take followed by the /out tab in the top-right pane. Now select mantra1 and, in its Parameters, click Render: Mplay will render a preview of the Beauty pass. It's currently only being lit by a key light and contains no shadows.

In the Take List, select BEAUTY, then click Add Take. Name this take **RGB**. Adding a take in this fashion means that the new take inherits all the properties of the BEAUTY take. Any parameter that you change in the RGB take won't affect the BEAUTY take, however. In other words, only downstream parameters are affected.

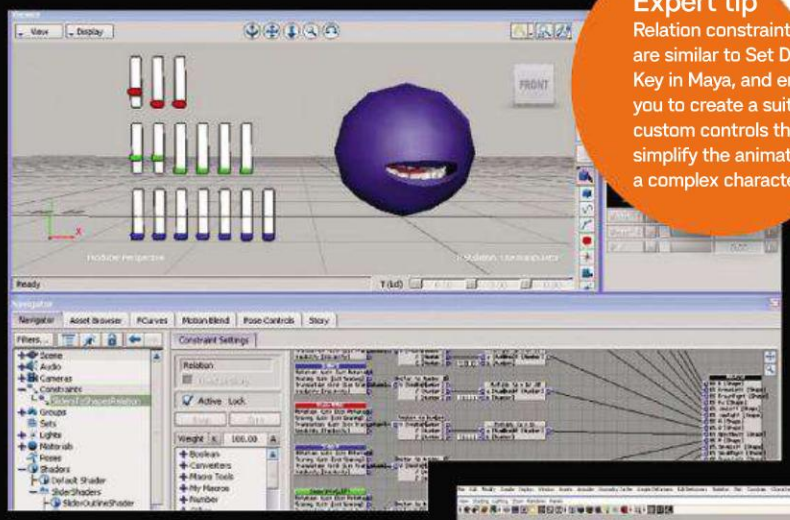
In the /obj tab, select the three light objects by dragging a marquee around them. In Parameters' Light tab, right-click the Light Color label and select Include Selected In Take. Do the same for Light Intensity, then set its value to 1. Select KEY alone and set Light Color to 1, 0, 0. For FILL, set Light Color to 0, 0, 1. For RIM, set Light Color to 0, 1, 0.

In the /out tab, select mantra1. In Parameters, select Properties tab > Output tab, then right-click Output Picture and select Include in Take. In the Output Picture field, change Beauty.tif to **RGB.tif**. In the Take List, select RGB, click Add Take and name the new take **rgb_ip**. In mantra1's Parameters, add Output Picture to this take, then change the entire Output Picture field to **ip**. Include the Override Camera Resolution setting in the take and enable it. Click Render: it looks pretty, but it's missing shadows.

Select the RGB take, then marquee-select the three light objects again. In the Shadows tab, add Shadow Type to the RGB take, then set it to Depth Map Shadows. Select the rgb_ip take and render. That's looking better, but the shadows could use some tuning. With all three light objects selected, include and set the following settings in the RGB take: Shadow Quality at 5; Shadow Softness at 2; Shadow Blur at 0.01; and Pixel Samples at 3, 3. Render the rgb_ip again: much nicer!

Now you're ready to render out full-size versions of the Beauty and RGB passes. In the pane that includes the Take List tab, click the plus sign and select New Pane Tab Type > Render Scheduler. Select the BEAUTY take and press Render on mantra1. Once that finishes, render the RGB take. Using Houdini's compositor, you can then do some lighting compositing magic with the two render passes until you get some satisfying results.

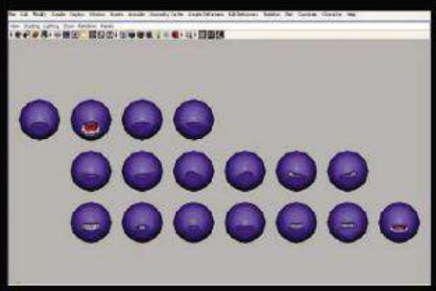
Carlos Donis Lemus is an associate CG supervisor at EA Canada, working on procedural tool implementation
ea.com



**Expert tip**
Relation constraints are similar to Set Driven Key in Maya, and enable you to create a suite of custom controls that simplify the animation of a complex character

You can use the sliders in your custom UI to animate and combine your model's facial blendshapes quickly and easily

# MotionBuilder
## "How do I build a UI to control blendshapes?"
### Michelle Blok, via email



The blendshapes in Maya. It's important that you don't delete the targets before exporting the scene to MotionBuilder

**Stuart Haskayne replies:**

Open Blendshapes Initial.fbx from this Q&A's project files: it's a simple ball head with 16 blendshapes. (Note that the target shapes must remain in the scene when exporting blendshapes from Maya to MotionBuilder.) Select File > Merge and choose Slider.fbx from the project files to bring a custom slider model into the scene. In the Viewer, press [Ctrl]+[W] to enter the Schematic. Right-click and select Auto Arrange. Select SliderBase1 and return to the Producer Perspective.

Click Translate (on the right of the Viewer). Via the Reference Mode icon just above, switch to Local space and position SliderBase1 next to the head. Move the red slider to check its behaviour: the model includes translation limits, so it can only slide up and down.

Now to connect the translation of the slider to the use of a specific blendshape. Select Window > Asset Browser and click Constraints. Select Relation from the list and drag it into the Viewer. Select the head model. Select Window > Add Property Editor (Add Property View in MotionBuilder 2010 or later), then expand Shapes to see the blendshapes. Click the A button for each shape.

In the Navigator, expand Constraints and select Relation. With the head selected, [Alt]-drag from the Viewer into the grey Constraint Settings work area. Select Receiver from the menu that appears. In the Neutral node, the arrows by each blendshape can connect the translation of the slider to the use of a shape. Select the red slider in the Viewer and [Alt]-drag it into the Constraint Settings work area; select Sender. Right-click the Slider1 node and select Local transformations. Expand Number in the Constraint Settings list and drag Multiply (a x b) into the work area. Right-click the b [Number] input, select Set Value and enter **10**. (The slider has a range of 0-10 and the blendshape has a range of 0-100, so you must multiply the slider output by a factor of 10.)

Click Slider1's Translation output, followed by Multiply's a [Number] input. A Vector to Number node appears, enabling you to specify which Slider1 axis controls the blendshape. Right-click the X [Number] output and select Disconnect. Link Y [Number] to a [Number], then link Result [Number] to BS.OpenMouth [Shape] in the Neutral node. In the Viewer, move the slider to see the mouth open.

In the Viewer, marquee-select SliderBase1 and Slider1. Select Edit > Duplicate. Translate SliderBase2 in X and repeat the process above to control another blendshape, [Alt]-dragging Slider2 into the work area and making the same connections. You can copy and paste the existing Vector to Number and Multiply nodes to speed things up. Choose a different blendshape in the Neutral node. When you have a full set of slider objects, create a Group for them and turn off Pick and Trs, so you can't move them by accident.

In Blendshapes Final.fbx in the project files, the sliders are renamed and colour-coded according to whether they control the jaw, expressions or phonemes.

Stuart Haskayne is a project manager for Centroid3D. Previously, he worked for Sony Computer Entertainment
centroid3d.com

# Fusion
## "How do I create dust floating in the air with a depth-of-field effect?"
### fusionfan, from the forums

**Gregory Chalenko replies:**

The essence of floating dust is small particles, which get severely defocused when closer to the camera. They appear either as small dots or semi-transparent circles. The defocusing can be so intense that it's hard to reproduce with standard techniques while keeping the render time within reasonable limits.

This trick mimics the depth-of-field effect, increasing the particles' size and reducing their transparency proportionally. Start with a basic particle setup. Create a pEmitter tool and link it to a pRender. Add a Camera3D, link this and the pRender to a Merge3D, then link this in turn to a Render3D. The pEmitter's Region should be set to Cube, with Width, Height and Depth set to cover all the space between your camera and its focusing plane, plus some overlap. The pEmitter's Style should be NGon, with NGon Type set to Circle.

Now insert a pCustom tool between the pEmitter and pRender. This will adjust the particle properties depending on their distance to the camera. First, make some preparations. Right-click pCustom; select Script > UserControls. Name the control, set Type to Text and Page to Numbers. Click OK. pCustom's Numbers and Positions tabs are used to store and adjust values used in expressions. Let's assume that:

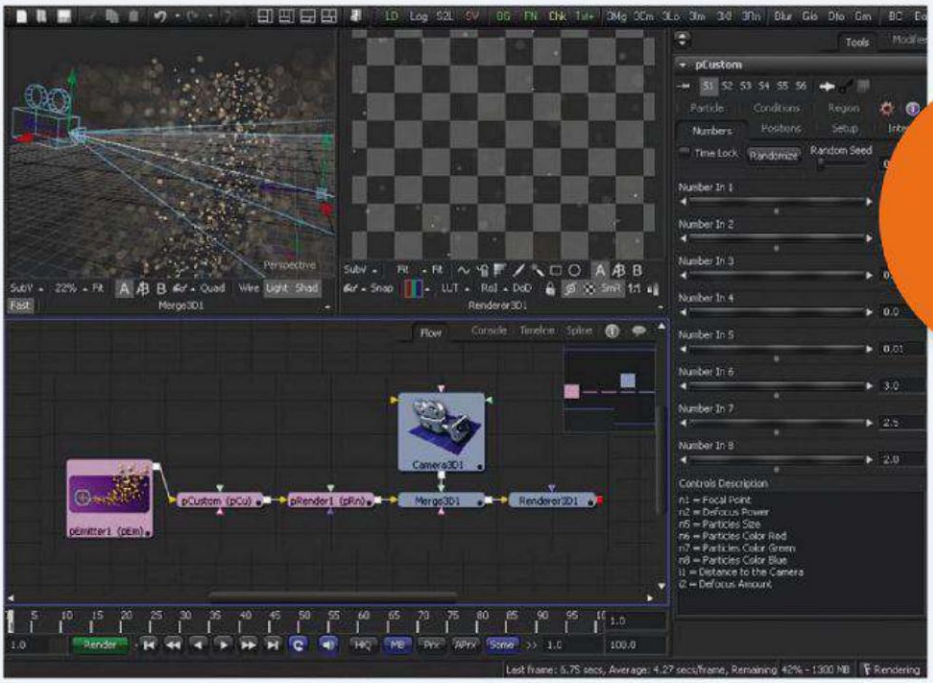
- Number In 1 is distance from the camera to its focal point; set it to 5
- Number In 2 is defocusing power; set it to 5

# Gimp
## "How can I generate successful rock textures for games?"
### mohd.itqan, from the forums

**Cirstyn Bech-Yagher replies:**

A mistake that's often made when generating a rock texture is to forget to differentiate between your diffuse and displacement maps. You need to go for the render of rock, not the look of rock. Adding a light into the texture will cause it to render wrong in many cases – and, unlike most organic matter, rock displacement maps don't always follow the diffuse map's colour scheme. Most rocks have a base colour, with a variety of hues running through it. Here, you'll replicate this in the texture, starting with the base.

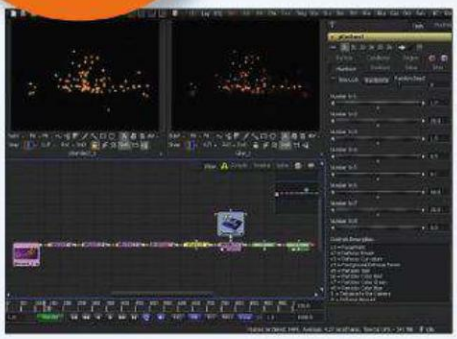
Cirstyn Bech-Yagher is a long-time 3D freelancer and is currently working on a series of tutorials aimed at newcomers to 3D
northern-studios.com



This macro depth-of-field effect is versatile enough to work with dust particles...

**Expert tip**
The technique that's employed here can also be used for sparks, rain, fine snow and other small particles

...Or, as in the screenshot below, an effusive display of fiery spark particles



- Number In 5 is the particles' size; set it to 0.01
- Number In 6 is the red component of the particles' colour; set it to 3
- Number In 7 is the green component; set it to 2.5
- Number In 8 is the blue component; set it to 2.0.

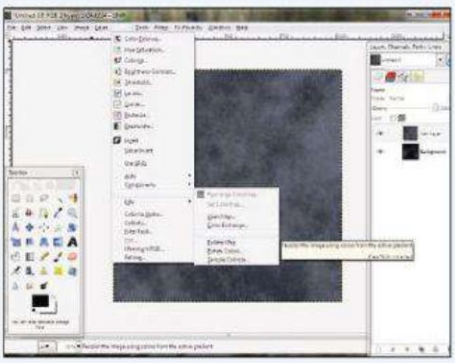
The size and colour have to be defined in pCustom – it resets them by default. Switch to the Positions tab. Right-click on Position 1 > X1. Select Expression. Connect the expression to Camera3D > Translation > X Offset. Repeat for Y1 and Z1, connecting them to their corresponding camera parameters.

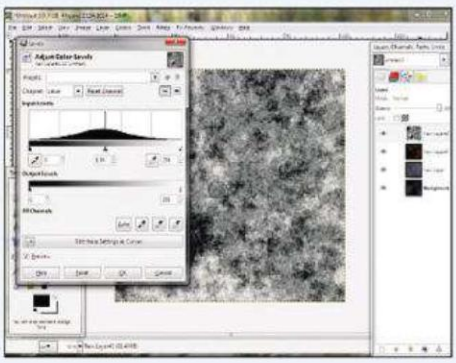
The final step is to add expressions in the Inter tab. For Intermediate 1, the expression **dist3d(p1x,p1y,p1z,px,py,pz)** calculates the distance between the camera and a particle. For Intermediate 2, the expression **abs(n1-i1)*n2+1** finds the distance from the particle to the point of focus. The result will be used to multiply the particle size. Note that here you use n2 (defocusing power) as a multiplier, then add 1 to get a positive integer in case the particle is in focus.

Now click the Particle tab. For Red Expression, enter **n6/i2^2**; for Green Expression, enter **n7/i2^2**; and for Blue Expression, enter **n8/i2^2**. Here, you divide the particle colour by the square of the size multiplier – the particle's area increases as a square of the size, and the opacity should be proportional to the area. Finally, for Size Expression, enter **n5*i2**.

You can also use the macro tool pQuickDOF_v01-1 .setting, included with this Q&A's project files. It incorporates all the expressions above and has two additional parameters. Depth Power Curvature makes the adjustment of the defocus size with distance more natural and Foreground Defocus Power adjusts the defocusing power of the particles between the camera and the focusing plane separately.

**Gregory Chalenko is a senior compositor from Moscow who works on visual effects for films and commercials**
compositing.ru





## 01 Get started

To start generating your texture, create a new file sized at 1,024 x 1,024. In the Toolbox, set Foreground Color to R 110, G 116, B 128, and Background Color to R 89, G 94, B 104. Select Filters > Render > Clouds > Plasma. Set Random seed to 525693 and Turbulence to 1. Select Colors > Colorify and set the colour to R 89, G 94, B 104. Select Layer > New and go back to the Plasma filter: set Turbulence to 3.5 and click OK. Select Colors > Colorify and set the colour to R 110, G 116, B 128. Turn your texture almost completely grey by selecting Colors > Map > Gradient Maps.

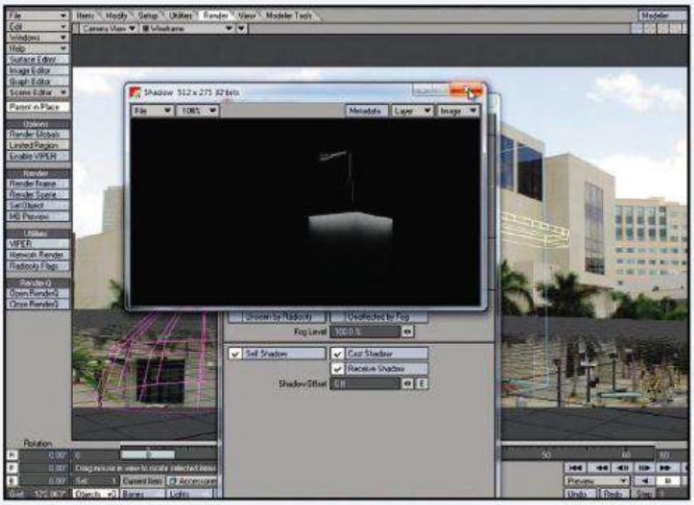
## 02 Add further layers

Select Edit > Fade Gradient Maps and set Opacity to 50. Set the layer's Mode to Screen. Fill a new layer with Plasma, with Random seed set to 776291607 and Turbulence set to 6. In Colors > Colorify, set the colour to R 122, G 68, B 15. Set the layer's Mode to Overlay or Screen, and Opacity to 55. You'll add details next. Fill another new layer with Plasma, with Random seed set to 525692 and Turbulence set to 7. Desaturate the layer via Colors > Desaturate > Lightness. Select Colors > Levels. Set the black input to 160. Set the layer's Mode to Soft Light and Opacity to about 25.

## 03 Finishing touches

Create a new layer and fill it with black. Select Filters > Noise > RGB Noise. Untick Correlated noise and Independent RGB, and then set the Red, Green and Blue sliders to 0.52. Select Filters > Repeat "RGB Noise" to apply the effect again. Set the layer to Soft Light with Opacity at 55. Now select Colors > Levels and set the white input level to 100 or a little less. Create a final layer and fill it with black. Select Color > Noise and fill the layer again. Set the layer to Screen at Opacity at 40.

Take some time to ensure that the shadows applied to the geometry match any light sources in the backdrop



# LightWave 3D

## "How can I realistically add geometry onto footage of a building?"

### eyelaview22, from the forums

**Eric Bacus replies:**

Realistic additions to photographic elements, such as buildings, rely on the accuracy of the corresponding geometry to catch shadow rays. In the case of a still photograph of a building, you can model a 'holdout' object with relative ease and should be able to line it up with some camera manipulation and a little patience. If possible, go into your favourite image editor and pull textures from your photo reference to remap onto your object. Distort and warp the texture as necessary.

Switching between Layout and Modeler, line up your scene as you see fit. With your holdout geometry selected, make a new surface called **Shadow**. Add building modifications as you wish, resurfacing new parts as necessary. In Layout, after properly aligning your scene to the background image that you're using, do a few test renders and match the lighting conditions of the photo as closely as possible. Change your camera position and rotation to match the proportions of your background image.

When you're satisfied with your setup, select your accessories and click Properties. In the Render tab, enable Matte Object and set Alpha Channel to Constant Black. Select Windows > Image Processing. Click Add Image Filter and select Render Buffer View. In the Buffer View options, enable Shadow. Render a frame and select the Shadow layer, then save the image as **Shadow**.

In Effects' Compositing tab, change Background Image to none. Open Properties and change your accessory layer back to its original settings, then change your holdout object to Matte and Constant Black. Render this frame and save it as a 32-bit file called **RGB**.

The rest of the composite should be taken to an image-editing application of your choice. Bring in the base photograph layer, darken it with the Shadow layer and overlay the RGB layer on top. Extensive colour correction will most likely be necessary to achieve a natural look.

# Maya

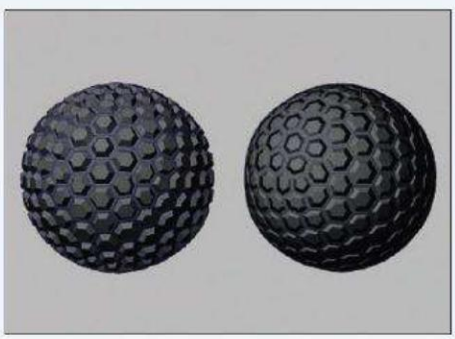
## "How can I display high-res detail in low-res geometry?"

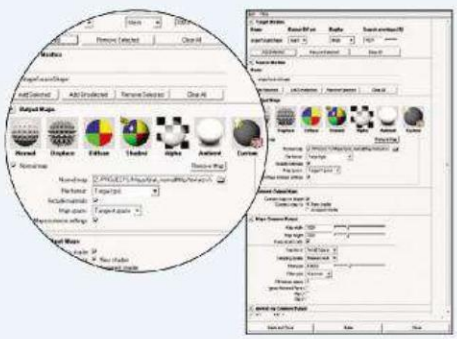
### Grahame Harper, via email

**Firat Enderoglu replies:**

An effective method of displaying high-res detail in real time without having the actual geometry in your scene is to use normal maps. They not only enable you to see the detail, but also make it react to the light in your scene. These maps are renderable and for objects that aren't close to the camera, you might never need to have the actual high-res shape loaded.

**Firat Enderoglu is a senior pipeline TD at Sony Pictures Imageworks, splitting his time between Arthur Christmas and The Smurfs**
imageworks.com



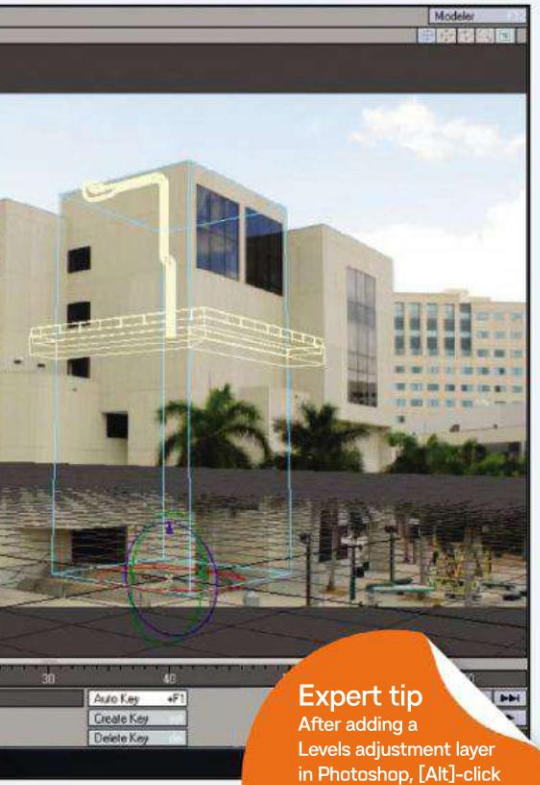


### 01 Prepare the geometry

To bake high-res detail into a normal map, you need two pieces of geometry: one high-res and one low-res. The low-res geometry's volume should be as close as possible to the other shape to achieve the best results. Make sure that you have non-overlapping UVs on both shapes. Having properly laid-out UVs will help this whole process: you're baking out maps, after all.

### 02 Bake the maps

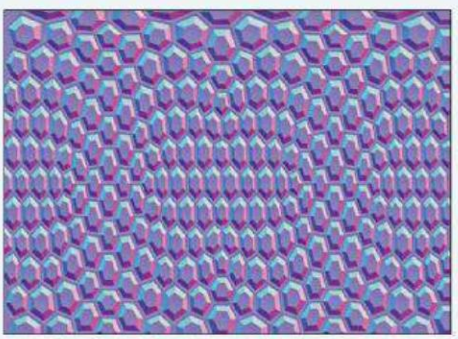
To start baking, select Lighting/Shading > Transfer Maps in the Rendering menu set. Select the low-res geometry, then choose Add Selected under Target Meshes. Make the high-res geometry your Source Mesh. Under Output Maps are many different maps you can bake out. If you have another map selected, click Remove Map, then Normal. The default settings should get you going on your first run. Under Maya Common Output, adjust Map width, Map height and Sampling quality to suit. Click Bake and Close.



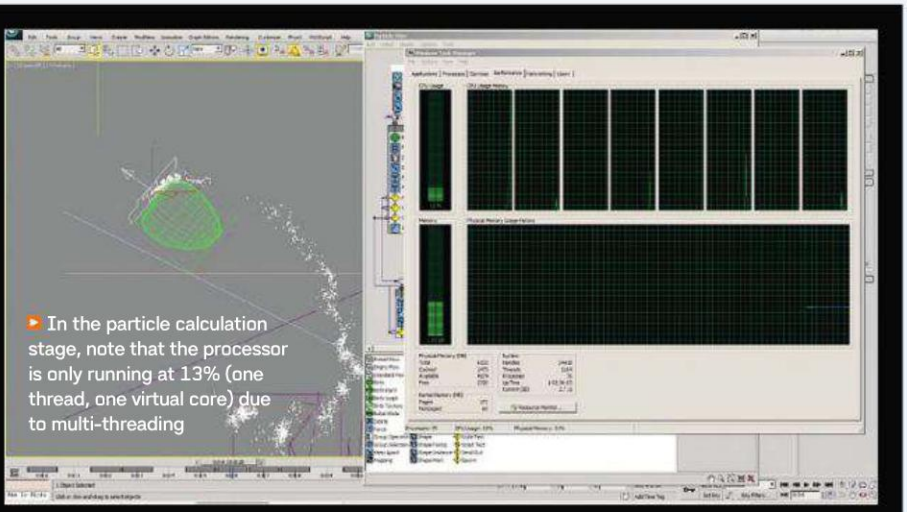

Getting your geometry (shown in wireframe above) to blend with a backdrop requires care with alignment and shadows

**Expert tip**
After adding a Levels adjustment layer in Photoshop, [Alt]-click the mask and paste the greyscale shadow render to use as a mask as you change your levels

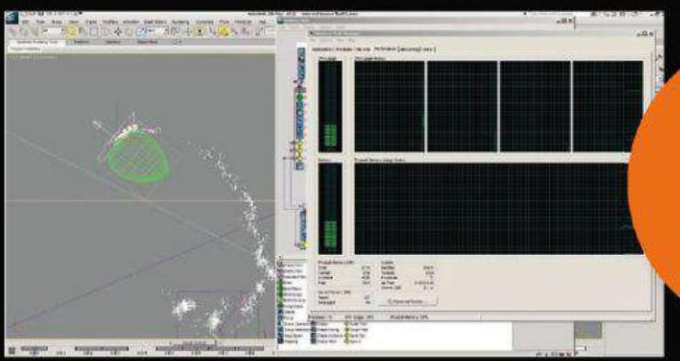
Eric Bacus is a CG artist in the Kansas City-based Branit VFX. His resume includes many primetime shows, including Lost
ericbacus.com



**03 Display it**
Once the bake process is done, you'll see in your scene file that the target shape has a new material with a bump map on. With default settings, Maya prepares all the material settings. To display the normal map in real time, turn on Renderer > High Quality Rendering in the viewport and enable Show > Textures. The low-res geometry now has the high-res detail built into its material. If you move a light over the object, you'll see that the normal map behaves in the same way as the high-res geometry.



In the particle calculation stage, note that the processor is only running at 13% (one thread, one virtual core) due to multi-threading



With multi-threading disabled, the processor is now running at 25%, reducing the particle calculation time

**Expert tip**
Get more help with editing your Bios with Mike Williams' guide on TechRadar, available via **tinyurl.com/radar-bios**

# 3ds Max
# "How can I make 3ds Max use the full CPU?"

## Allen Keen, via email

**Pete Draper replies:**
For the most part, 3ds Max is multi-threaded. If you've been living under a rock during the last decade, this means that several instructions can be handled simultaneously by the software. This speeds up the overall calculation process if your computer processor has either two or more cores, or a single core with two or more virtual processors. You can combine physical and virtual cores: you might have a quad-core system with two virtual processors per physical core, making a total of eight virtual cores. Make sense?

Today's CPUs, whether they're Intel or AMD, are designed to be multi-threaded. Unfortunately, there are sections within 3ds Max that aren't multi-threaded purely due to their nature; Particle Flow is a prime example of this.

If you use Particle Flow on a standard Core i7 system (which provides eight virtual processors), it runs on a single thread. Particle calculation, whether it's within the viewport or at render time, results in your load being registered at just 12.5%. (Task Manager rounds it up to 13%.) Particle Flow is using one eighth of your machine's full potential.

So how can you utilise the remaining 87.5%? Well, you can't. The best you can do is to convert the entire system back to a single thread by disabling multi-threading in the system BIOS, rebooting and firing up 3ds Max again. To access your computer's BIOS settings, restart it and look for the instructions on-screen during the boot process. Press the key that's indicated to enter the BIOS settings, then look for the multi-threading controls. (Intel calls it HyperThreading.)

This sounds like a convoluted solution, but you'll notice that Particle Flow et al will behave faster since they're now using close to the full core's potential. The downside, as you might have anticipated, is that when it comes to using elements of 3ds Max that are multi-threaded – mental ray rendering, for example – you'll notice an increase in render time.

A workaround is to edit the BIOS to work in single-threaded mode for development, then switch to multi-threading for rendering. If you have the ability to cache out all of your particles and simulations to disk (if you have Particle Flow Tools: Box 3, for example), this cuts down particle pre-calculation to a bare minimum at render time, which is where multi-threaded machines tend to lag. ●

Pete Draper is the division head and chief technical director of Makuta VFX, Hyderabad. The studio was formed in 2010
makutavfx.com

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Native DXF, DWG, DWF-3D & Inventor
File Formats
.dxf, .dwg, .ipt

**CATIA, SAT**
Native CATIA v4, CATIA v5 & SAT
File Formats
Many

**JT, IGES, STEP**
Plus All Major 3D CAD File Formats
File Formats
.iges, .jt, .step

**OpenFlight**
Industry Standard VisSim Import-Export
File Formats
.flt

### *Common Solutions & Benefits*:

- Solid, robust solution used around the world by tens of thousands of 3D professionals and well known companies
- Import and compose 3D scenes from a plethora of 2D/3D file formats then render out to high quality images for print media, training manuals, or marketing brochures
- Popular for downstream repurposing of ProE, CATIA, JT, SolidWorks, Inventor, IGES, STEP, etc. to D.C.C. programs
- Highly refined & popular 3ds Max <-> Maya pipeline via native plug-ins, with over 14 years of development & production use
- Robust import, optimization & rendering of CAD, VisSim, D.C.C. and AEC models
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- All Granite CAD converters for US$395 (ProE, ACIS, IGES, STEP, Parasolid. Crack-free BREP solids converters
- Publish to WEB streaming file formats: XAML-3D, OpenHSF, DWF-3D, SW3D, DirectX, U3D, VRML 1+2, X3D (archival quality) & XGL. Embed U3D in PDF
- A wonderful addition to Google Earth and Google SketchUp: adds dozens of new, industry standard 3D file formats and provides architectural rendering
- Mesh & scene processing toolset, including excellent built-in polygon reduction system
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# 3D WORLD

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Model by Mayan Escalante; render by Don Waters. ©2010 Square Enix Co

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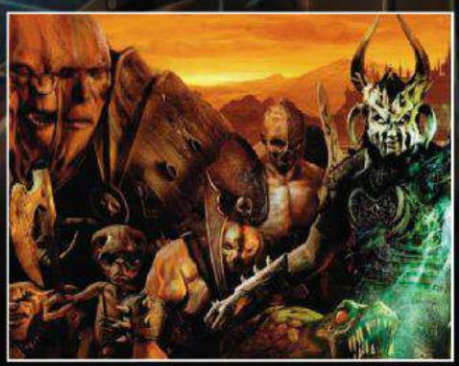

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Tips and tricks for staging your models and adding dynamism to renders and turntables

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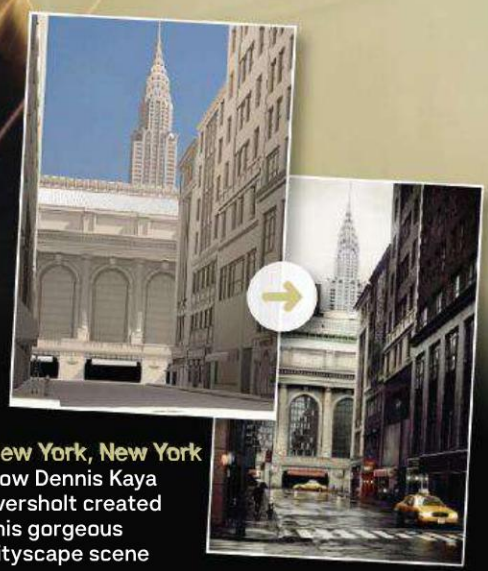
Combine hard rock surfaces with organics as you sculpt this troll model



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Software
Modelling, animation and rendering tool

**PRICE**
Full version
• £599 / $895 / €695
Upgrade from any previous version
• £339 / $495 / €395
Printed documentation
• £69 / $100 / €80

**PLATFORM**
Windows / Mac

**MAIN FEATURES**
• Viewport Preview Renderer (VPR)
• Linear workflow
• Improved I/O
• 3Dconnexion support

**DEVELOPER**
NewTek

**WEBSITE**
lightwave3d.com

Using the Piranhalien from the LightWave 10 content. Unlike the VPR equivalent (right), this final render includes motion blur and depth of field

# LightWave 10

## Industry veteran NewTek has brought out an update to its 3D application. **Ben Vost** finds out whether it's worth the upgrade

The last time 3D World reviewed LightWave was version 9.5 in December 2008. LightWave 9.6, widely considered the best yet, was released just a month later. NewTek then announced a next generation of LightWave called CORE. This isn't that LightWave. NewTek decided that since creating a worthy version of CORE would take a lot longer than envisaged, a new ordinal version of its flagship 3D software would be released, with CORE available to those who want to help beta test it and included in all LightWave 10 licences when finished.

LightWave 10 is a solid release, with new features that are mostly well done, if a little raw. The most immediately obvious is the Viewport Preview Renderer, VPR, which transforms any 3D viewport into a rapid iterative renderer that can have snapshots saved from it – meaning that often you won't even need to hit [F9]. There are certain things it can't see at the moment, notably depth of field, motion blur and preprocessed nodal surfaces. However, it does see some things that LightWave's most famous interactive renderer plug-in, FPrime, can't, such as Hypervoxels, FiberFX and volumetric lights. FPrime owners will need to weigh up this and the fact that VPR pays attention to LightWave's own radiosity settings and linear workflow tools to make the decision whether to upgrade.

LightWave now has an easy-to-use end-to-end linear workflow system, with centralised global controls and individual overrides where necessary, that compares favourably to packages such as 3ds Max and Blender. For new scenes created in 10, leaving all the controls set to linear should be all that's needed to get richer renders that are ideal for further post-processing – although bringing in older scenes will require some thought for best results.

You can now see anaglyphic stereo in OpenGL and in VPR, including animated previews. This feature supports toe-in and parallel-style stereo, but doesn't yet offer the possibility of off-axis or parallel axis asymmetric frustum, or changing the colours of the lenses in the glasses used. While these omissions mean that it's similar to the anaglyphic system added to LightWave 5.5 in 1997, the added VPR functionality means it's a lot more useful than having to render separate frames and composite them. Toe-in is really the only physically possible choice available for compositing LightWave with live action, but for all-CG shots either of the other two mechanisms would be better.

### VIRTUAL STUDIO

Another addition to Layout is the Virtual Studio tool. It's an interesting concept for those with the opportunity to exploit it. Imagine a hydra with an animator for each head and someone else controlling the camera that's filming it, all in one copy of LightWave. Using 3Dconnexion devices and InterSense's VCam, this is in theory possible, but the Virtual Studio is in its infancy; fragile and poorly documented.

Support for 3Dconnexion's 3D mice is a welcome inclusion to Layout, though. With the device set to Walk, you can specify a ground plane through which the camera or other chosen object can't pass and a bank

### WHAT ABOUT CORE?

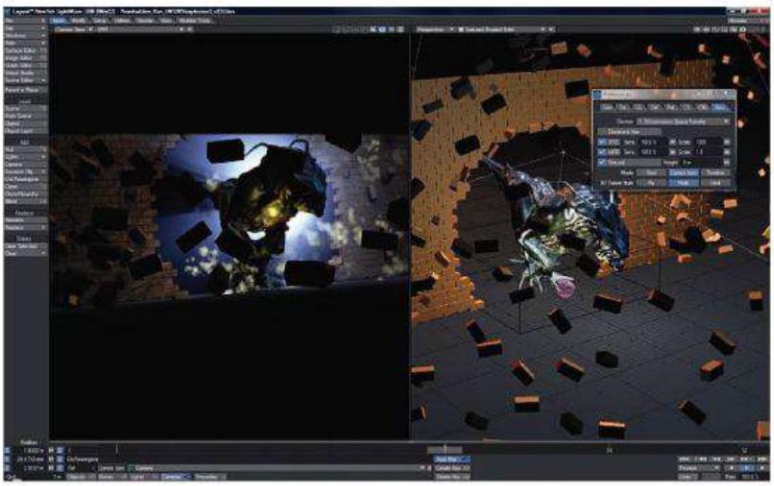
CORE was originally announced in February 2009 and was expected to be released by the end of 2010, as reported in 3D World 133, but the decision was wisely taken to keep it in beta and temporarily switch focus to a new version of LightWave 3D.

People buying into LightWave 10 now get it at the original price of $895 and are entitled to a complete version of CORE version 1.0 when it's released later on in 2011. People who buy in once CORE is released will need to pay the increased cost of $1,495.

CORE will feature a modifier stack, history and the ability to nodally connect anything to anything in the same fashion as Houdini, but for those outside NewTek's HardCORE programme it's all been a bit of a damp squib after the excitement of the initial two-week viral campaign.

**About the author**
Ex-NewTek employee Ben Vost is currently teaching LightWave to architects and graphic artists at the École Supérieure d'Arts Appliqués near Bordeaux, France, and translating French training DVDs into English.
esaa-aquitaine.com

VPR can be used in more than one viewport at once and at different resolutions, as shown here. FiberFX can only be shown in the first viewport, though. NewTek has added a snapshot button that enables you to save the viewport image to disk



Using a 3Dconnexion SpaceExplorer enables you to set your shot quickly and comfortably, while VPR, new to this version of LightWave, can show volumetric features such as lights and voxels in the viewport

limit to steady motions, whereas Fly allows you full aerobatic possibilities. Right now, you can't customise the various buttons on more advanced 3D mice, which makes it awkward for use in Modeler, where keyboard shortcuts are more necessary.

LightWave's MDD system has been in use for transferring point-level animation between 3D apps for a long time and plug-ins such as PointOven are well-established in other 3D tools. MD Scan and Bake have been updated for Autodesk's Geocache equivalent to be used and to bake multiple items at a time. Importing and exporting Geocache vertex data caches between LightWave and Maya works well and there are no longer any scaling issues.

While inter-application data exchange is a major focus of this update, LightWave is still hampered by the fact that it uses a different rotation order to other prominent applications, making transferring higher-level animation between LightWave and other packages less easy than it should be. Although the Valkyrie suite of I/O tools received a lot of work in the development of 10, moving a character from one environment to another using FBX or Collada is problematic if you aren't using the strict rigging and naming conventions imposed by MotionBuilder. LightWave's ZBrush compatibility has also been improved, with better OBJ exporters creating their own MTL files and handling scaling more effectively.

## THE DOCUMENTATION

The major problem with LightWave 10 is the documentation. It's an ugly mix of the manuals from 7, 8 and 9, with new bits from 10 thrown in. Screenshots aren't uniformly updated and often the text refers to an older way of achieving a task that hasn't been possible for a number of years. Some of the new features can't be found easily or at all, and the page layout is haphazard and inconsistent.

If you're on a 64-bit Windows or Mac machine and already have 9.6 and FPrime, you might wonder whether you should upgrade. If linear workflow, better communication with other packages and improved MDD controls are important, then it's a yes. Should you primarily be a 9.6 modeller, though, version 10 offers nothing useful you don't already have.

Exporting in FBX or Collada formats using defaults ruins this scene because of rotation order issues. However, the Geocache format works just fine in both directions


However, if you're still using a version prior to 9, we'd say go for it, particularly for the easy linear workflow, powerful and artist-friendly render engine and increased accent on decent I/O. For those who've never used a 3D package before, LightWave has a shallow learning curve and one of the friendliest communities around – and the price is outstanding. Our main concern with this version is that NewTek finishes what it's started and these new features don't wither on the vine like Motion Mixer or IKBoost have done.

Previews can be rendered rapidly with VPR and the window undocked for more resolution flexibility, giving very accurate animation tests

## 3D WORLD VERDICT

**PROS**

- End-to-end linear workflow
- VPR feature speeds up texturing and lighting immensely
- Good-looking new UI
- Extensive bug-fixes throughout

**CONS**

- The manual is extremely poor
- A difficult decision if you already have 9.6 and FPrime
- Still no major Modeler updates

**LightWave 10 isn't a huge update, but it's one that we hope will be consolidated over the course of this version**

Software
3D content creation tool

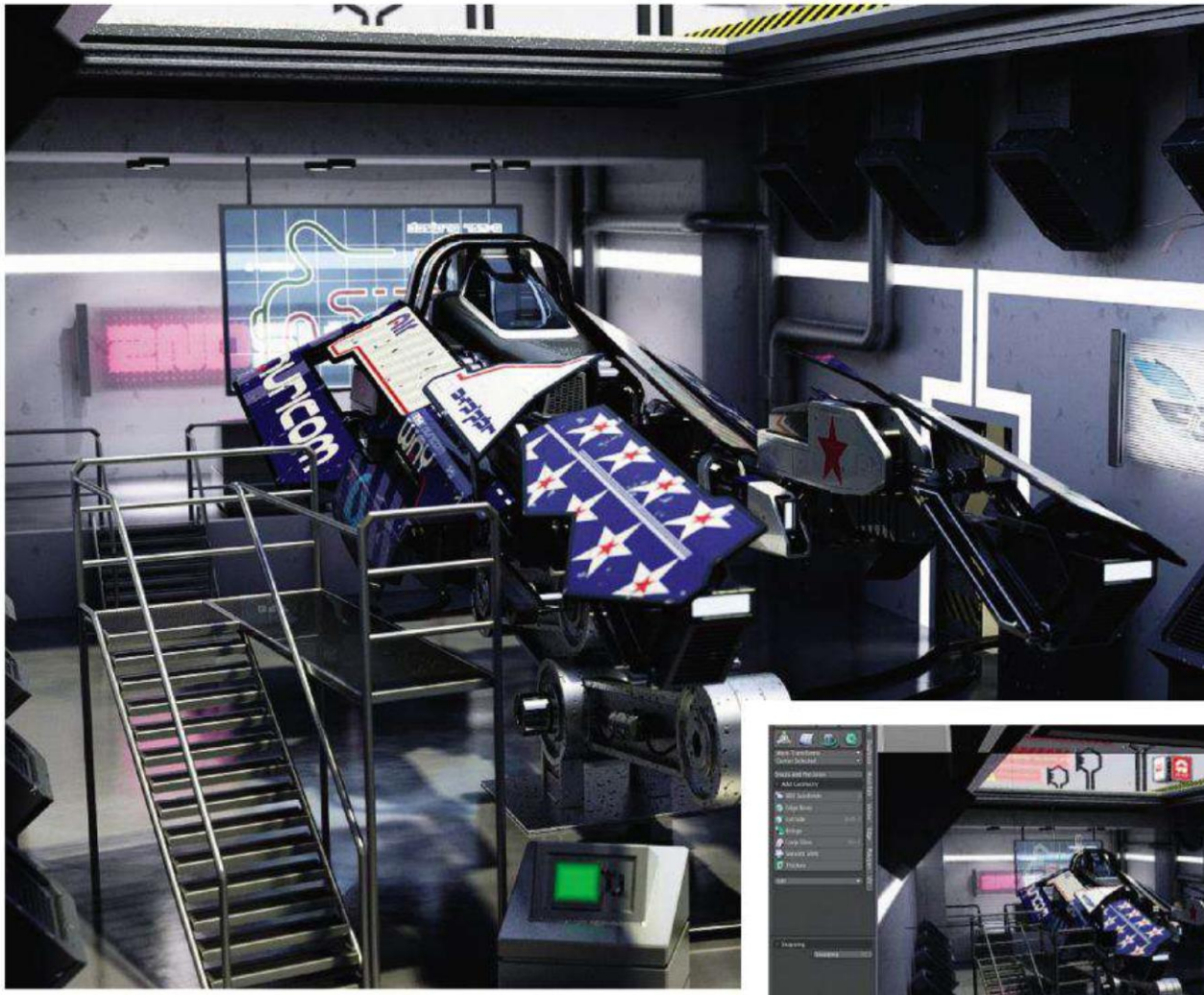
**PRICE**
modo 501
• £642 / $995 / €756
Upgrade
• £255 / $395 / €300

**PLATFORM**
Windows / Mac

**MAIN FEATURES**
- Improved render speed and quality
- Pixar subdivision surfaces
- Multi-resolution sculpting
- Occlusion shader
- Enhanced depth of field and bokeh effects
- Numerous toolset and UI improvements
- Enhance:modo Texture suite included

**DEVELOPER**
Luxology

**WEBSITE**
luxology.com





With the new RayGL, renders can be previewed directly in any viewport, which speeds up your workflow immeasurably

# modo 501

## Expectations are high for the latest version of Luxology's flagship application, says **Paul Beards**, but does modo 501 deliver?

Since its inception, Luxology has primarily marketed modo as a modelling tool, and one that integrates easily with a wide variety of different production pipelines. Over the years, each major release has added significant features to this slick and intuitive package, but – on paper at least – 501 appears to be a consolidation of the existing feature set, rather than the launch platform for new and exciting functionality.

Indeed, 501's roll out has been a much more low-key affair than that of 401, which was preceded by a number of online feature reveals leading right up to release. However, after extended time with 501, we can say that while there's been consolidation of the existing tools, it has more than enough new features to justify its billing as a major release.

Browsing the modo forums, it's clear that many expected 501 to be the 'character animation' release, but this isn't the case. The animation tools have received a fair number of upgrades this time around, and while stopping short of full CA functionality, it's obvious that Luxology has laid a solid foundation for it to appear in a future release. The software's inverse kinematics tools have been improved, and a new node-based schematic view for the animation pipeline makes its debut. Changes such as these not only add extra functions now, but also hint at major additions further down the line. Adding a character animation toolset would require a solid code base to be properly integrated, and 501 looks to go some way to providing this.

### NEW MODELLING FEATURES

Modelling is where modo has always excelled, and with 501 the list of improvements is staggering. Regular subdivision modelling is still present and correct, but Pixar subdivision surfaces modelling makes its debut, and proves to be one of 501's most invaluable new features. The advantage of P-sub modelling is that bevels and edge sharpening can be done primarily with edge weighting, reducing viewport polygon counts significantly, and the Pixar sub-d algorithm gives a smoother result than regular sub-d models. Objects created using the P-sub/weight map method can also be exported to Maya 2011 (via FBX), which is a huge boon to studios that use modo in their pipeline.

Pixar sub-d models can take advantage of another of 501's new features – multi-resolution meshes. A model created using Pixar sub-d can have a minimum sub-d level set, and then be divided further using the multi-resolution controls. In this way, a simple shape can be subdivided several times to enable high-resolution sculpting on the actual mesh, but with the option of returning to the low-resolution model at any time. All high-resolution sculpt data will still be visible at the higher resolution, but this gives more flexibility in how you handle high-detail sculpt data, such as baking displacement maps for the low-res mesh.

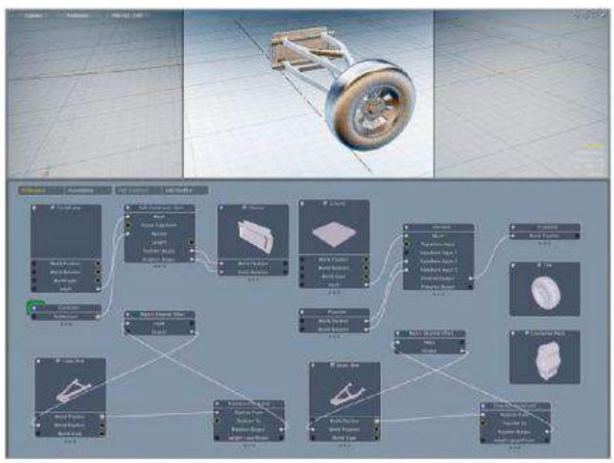
**About the author**
Paul Beards is a senior illustrator for Dyson, where he's been for the last six years. A modo enthusiast, you can often find him posting on the Luxology forums under the username Sumimasen
web.me.com/paul.beards

modo handles more complex scenes with ease, especially in 64-bit, provided you have the RAM to take advantage of it

This object is textured with the new Enhance:modo Textures and occlusion layer masking



The centre object here shows the advantage of Pixar sub-d over regular sub-d (right), when used with weight maps



A new schematic viewport provides a nodal system with which to build complex rigs and animated scenes

Rendering has been a main feature of modo since 201, and it too has seen a massive number of improvements in 501, both under the hood and in terms of added functionality. Render speed and quality have both been enhanced enormously, and the preview engine has been given a full overhaul. In 401, modo's render preview was no slouch, but the speed improvement in 501 is obvious.

Complementing it is RayGL, which gives a low-res version of the preview render in your working viewport and is updated on-the-fly. 501 also sees enhancements in render quality, with new anti-aliasing options, improved depth of field and motion blur, and advanced camera settings with full bokeh. Displacement quality has been optimised and integrated with the newly recoded bump mapping algorithm. Both bump and displacement now give far superior results, with lower overheads, although because these use a completely new engine, any legacy files that use bump or displacement maps will need to be checked and most likely adjusted in 501.

Procedural textures have been given some much-needed attention as well, with 501 now offering the Enhance:modo Textures (a suite of 149 new textures and presets), as well as standard procedurals. Each is fully customisable, and when combined with the new occlusion shader, they can create stunning results, especially when applied as a combination of bump maps and layer masks.

## FURTHER ENHANCEMENTS

Using 501 is just as much of a joy as ever, and users who've been with modo for a few years will notice small changes to the UI, and that a few tools and menus have moved. That said, 501 still feels familiar and snappy, even with the added features. Modelling with modo has always been a fast and enjoyable affair, and with the new render enhancements, previews no longer feel like a bottleneck in your productivity.

Luxology has also achieved feature parity between the Windows and Mac OS X releases with 501, as 64-bit versions are now available for both platforms. The new OS X Cocoa build, while suffering from a few (documented) bugs, is solid enough, and Mac users with both Snow Leopard and more than 4GB of RAM will see huge benefits with larger scenes.

There are, however, some glaring omissions from the feature set. Forgetting the aforementioned character animation tools, modo still lacks any form of dynamics, particle or fluid simulation. A soundtrack option would also seem like an obvious addition given that animation has been present since 301.

modo has been maturing nicely with each new release, but when we first browsed the feature list, we were worried that development may be slowing with 501. Such fears proved unfounded, though, as the new bells and whistles are very impressive. Combine this excellent feature set with the fact that the core of the application has been polished to such a high sheen, and you're undoubtedly left with the finest iteration of modo yet.

## 3D WORLD VERDICT

### PROS

- Pixar sub-d modelling
- Fast, clean renders
- Consolidated feature set

### CONS

- No character animation
- Glitchy Cocoa release

**modo silences the doubters as Luxology release the most stable and feature-rich version of the software yet. Character animation may be conspicuous by its absence, but there's easily more than enough here to compensate**

Software
Architectural visualisation tool

**PRICE**
• £640 / $980 / €749

**PLATFORM**
Windows

**MAIN FEATURES**
- Real-time scene creation and population
- Import of various 3D file formats
- Contains a vast content library
- Output to animations and stills in various resolutions
- Theatre mode for live demonstrations

**DEVELOPER**
Act-3D

**WEBSITE**
lumion3d.com

# Lumion

## Easy to learn and with a packed content library, Lumion gives architects another tool for their pipeline, says **Michiel Quist**

Act-3D, the developer of Quest3D, has launched a new tool called Lumion. It's aimed at architects who want an easy-to-use animation and presentation program. You can import a 3D model, materialise and populate the scene, then output it to animations or stills. We haven't seen any other software that does the same thing as Lumion with such a gentle learning curve.

We tested the software on an Nvidia GTS 350M. While this is a little slower than the minimum requirements, performance was still pretty good. Lumion uses the GPU for the user interface, editing and rendering, so it's recommended that you buy the fastest GPU your budget allows.

After starting up Lumion, you have a few options: you can start a new scene, load an example scene, open an existing scene or go to the tutorial website. If you start a new scene, you can choose from nine different environments, which are a good starting point for most of the world's scenery. You can easily add mountains or water surfaces and change the ground texture to fine-tune the look.

For sky and lighting conditions, Lumion comes with a weather system. The basic system enables you to adjust fog depth, sun direction, sun height and cloudiness. Cloudiness controls the density of the clouds and lets you make the sky either clear or overcast – although the cloud formation (pattern) can't be changed. In the advanced weather system, you can alter light (sun, sky and shadow lighting/colouring), effects (screen space ambient occlusion and wind strength), camera settings (exposure, focal length and so on) and fog/cloud settings.

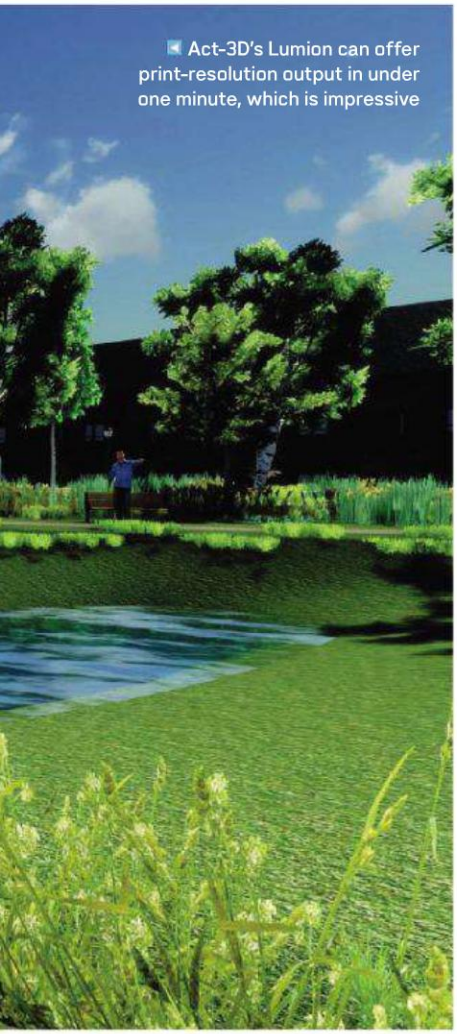
### EASY IMPORTS

Importing an object into the environment is as easy as it gets. Lumion supports most popular 3D file formats, such as COLLADA, FBX, MAX, 3DS, OBJ and DXF. If you want to import MAX files, you need to have a working version of 3ds Max on the same system. The imported model will be put in your own model library inside Lumion and can be placed by dragging and dropping it in your environment.

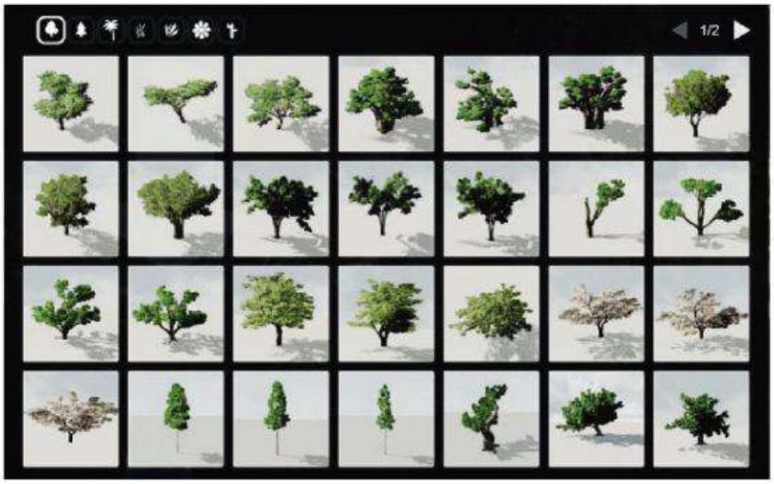
If you don't like the existing materials on the imported model, or some areas don't have any, it's easy to select different parts and start materialising them. Lumion comes with over 450 preset materials and you can also make your own by using a custom shader. These shaders enable you to start your creations from scratch and the various properties, such as bump value, Fresnel values, reflection strength and sharpness, let you create pretty realistic-looking materials. Be careful if you change materials or make any other alterations, though, because you can only undo one step for many major functions.

To enhance the environment and make the final presentation look real, you can populate it with trees, people, cars, generic buildings, street furniture and so on from the content library that comes with Lumion. Simply drag and drop the content into your scene and then move and rotate it to the correct position – unfortunately, there's no scaling option. As content is one of the most important features, customers can expect a large initial library and regular upgrades and/or service packs that will expand it even further.

**About the author**
Michiel Quist is the owner and founder of 3idee, an architectural visualisation company that's based in the Netherlands and specialises in stills, animations and interactive media
3idee.nl



Act-3D's Lumion can offer print-resolution output in under one minute, which is impressive



The content library that comes with Lumion is one of the program's biggest strengths

There are two ways of outputting the presentation: stills or animation. For stills, you can choose between four formats with a maximum resolution of 7,680x4,320. Animations can be outputted in three formats up to 1,080 full HD, either as an image sequence or MP4 movie.

You can build up your project by animating the camera, the objects and the weather system, and adding post effects. Camera animation is done by interactively manoeuvring to a position in your scene and taking a snapshot of the view. Go to the next position and take a snapshot there, and Lumion will make an animation path between those two points. This is an easy process, and also enables you to alter or fine-tune the animation afterwards.

## WORKING WITH OBJECTS

Animating objects is done in two ways: either you place pre-animated objects or you animate the movement of objects in the movie section of Lumion. There are a lot of pre-animated objects in the library, such as flying birds, grazing cows and so on. The high-quality trees and plants (from Speedtree) have wind animation on them too. Animating movement of cars, people or any other object is always done in one direction with one speed, which means you can't move cars up and down, or let people walk in a curve. Also, importing animated objects isn't supported.

Animating the weather system, on the other hand, can be done in almost every way. By animating the clouds, fog distance, sun colour or bloom, for instance, you can really control the final result.

To finish the look, you can add various post effects; use a colour correction to adjust the brightness and contrast or add motion blur and anti-aliasing. There are also a few Photoshop-like filters, such as Charcoal, Pencil and Sobel.

One thing that stands out is that there's no output into an interactive standalone presentation format. Since Act-3D has lots of experience with this from Quest3D, we hope that it'll fix it in a future update.

Lumion is already an impressive piece of software, but there are still a few important areas that need development. Importing models, materialising them and populating the scene is a piece of cake, while animating objects is limited. Given the gentle learning curve, vast content library and controllable look and feel of the result, Lumion is good value for money.

This is a tool that could easily be incorporated into the pipeline of many architects in the near future, though we're not sure that the software will find its way into other fields because it seems to be really specialised towards that market. Overall, however, we were pleasantly surprised by Lumion.

You can easily apply over 450 preset materials or your own custom shaders onto your model

Several effects that you can apply on the output will help to enhance the overall look and feel

## 3D WORLD VERDICT

**PROS**

- Very easy to learn
- Large content library
- Balance of quality versus speed

**CONS**

- Restricted object animation
- No interactive standalone output
- Very limited undo functionality

**Lumion does still need a little work, but Act-3D's software is already a valuable addition to the architect's pipeline. With this tool, you'll be able to create more convincing presentations in less time than you could before**

Software
Planar tracking and rotoscoping application

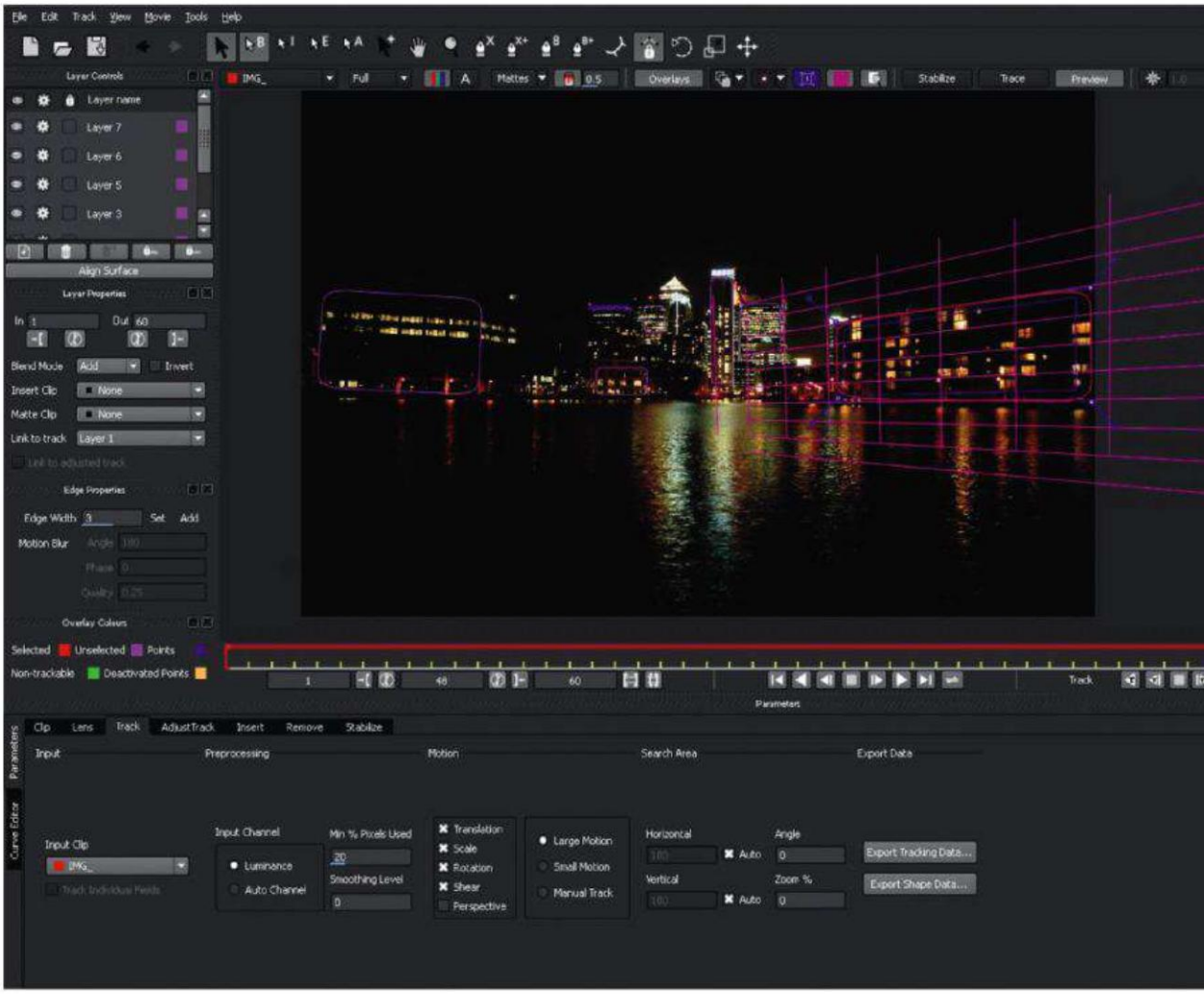
**PRICE**
Mocha Pro 2.5
• £934 / $1,469 / €1,098
Upgrade
• £559 / $879 / €657

**PLATFORM**
Windows / Mac / Linux

**MAIN FEATURES**
- Planar tracking with object removal, lens distortion correction and compositing
- Streamlined UI
- 64-bit architecture
- OpenEXR support

**DEVELOPER**
Imagineer

**WEBSITE**
imagineersystems.com




# Mocha Pro 2.5

## Mocha Pro offers rotoscoping and compositing as well as tracking. **Marc Rice** finds out if it's the complete package

It's hard to believe that in 2001, Mokey, Imagineer's first software package release, focused on removing foreground objects from panning shots. Imagineer has now evolved into a developer of world-class professional planar tracking software. The company's latest release, Mocha Pro, combines all Mocha's 2.5D planar tracking and rotoscoping tools with Mokey's clean plate generation techniques, plus a host of other features, including wire removal, lens distortion correction, stabilisation and compositing. The 64-bit optimised module has improved caching, and accelerated matte tracking and rendering time.

The user interface is similar to that of previous versions. Splines and tools can be found at the top of the screen and layers on the left, with other options below, including track adjustment tools, clip offset and stabilise features.

Mocha is known for its tracking features, so these seem like a good place to start. X-splines are used to create areas that search and track surfaces, with tangent points and tension options on the splines. Other useful options for tracking include translation, scale, rotation, shear and perspective, enabling artists to quickly overcome difficult tracks that would be almost impossible if using a point tracker. The Planar Surface tool is extremely useful, because the area you're tracking might not be the exact area that you'll want to patch or insert something onto later. The Surface tool enables you to see if what you're tracking will correlate to the exact location of what you hope to insert. Adding the Grid tool gives you an extra step of accuracy to make sure everything's lining up correctly and following the orientation of the Surface tool.

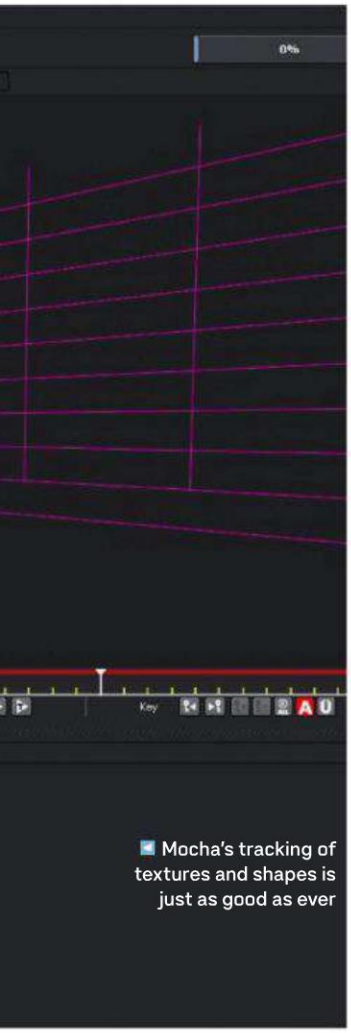
This is where the Viewer Stabilise feature reinforces just how good Mocha Pro is at tracking textures and shapes. Selecting this option stabilises your plate around the track. Place your mouse over a corner of the planar surface and you can easily see if your track is holding while you play through. If there are a few frames that are jumping, you can then use the Adjust Track tool to realign your track before exporting.

The only downfall with Mocha Pro's tracks is that when you import tracks into Nuke, the corner pin points clip to the edge of the frame, rather than the area you've tracked, making it hard to adjust the track afterwards, if you need to. However, this is a minor issue that you can get around by putting an additional corner pin before the Mocha track in your tree, and putting your to and from points in the correct position.

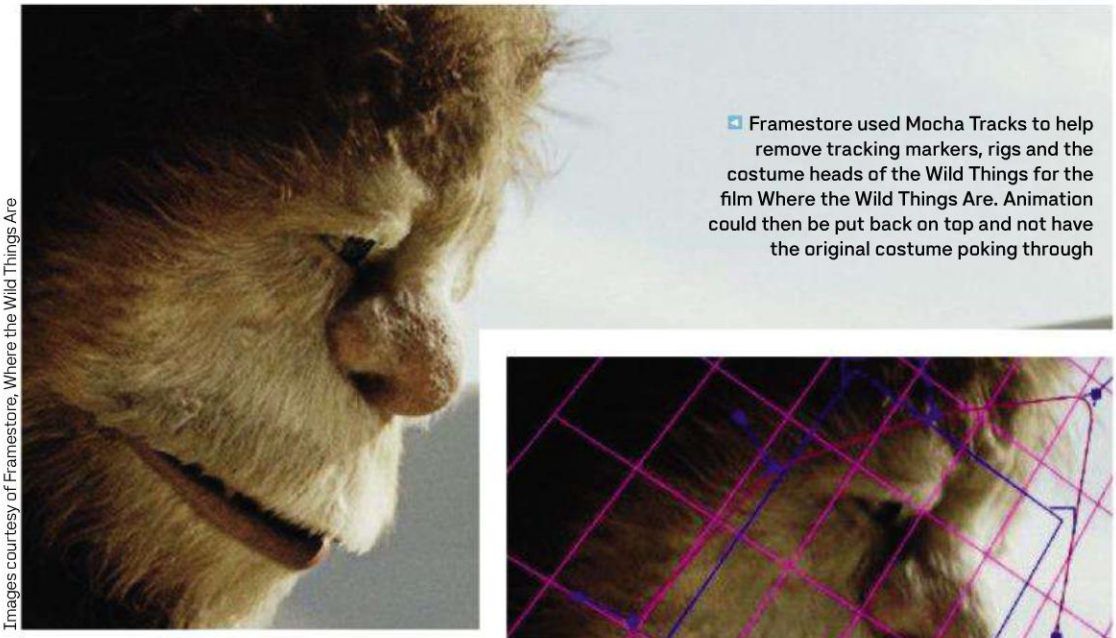
### OBJECT REMOVAL

Mocha Pro's Object Removal tool is what Imagineer first produced almost 10 years ago. It's a simple process, but will only work on shots for which it was designed. Like Furnace's Rig Removal tool, it functions best on panning shots where you want to get rid of an object from the foreground. Once Mocha's tracked the background, and the object you want to remove in the foreground, it calculates the movement and creates a clean plate by picking areas from different clean frames, patching them together and then tracking them in. In theory, this works well, but in

About the author
Marc Rice is head of paint and roto at Framestore London. He's worked in film VFX for two years on movies including Avatar, Harry Potter and The Chronicles of Narnia. His main workload is removing rigs and wires used during stunts on set
framestore.com

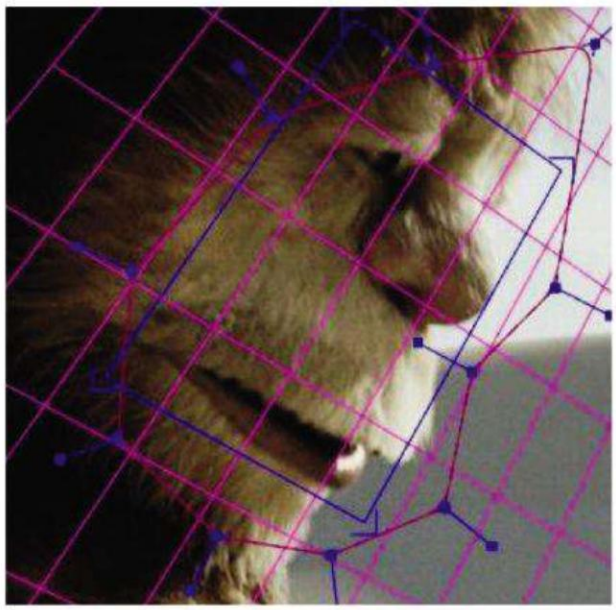


Mocha's tracking of textures and shapes is just as good as ever



Images courtesy of Framestore, Where the Wild Things Are

Framestore used Mocha Tracks to help remove tracking markers, rigs and the costume heads of the Wild Things for the film Where the Wild Things Are. Animation could then be put back on top and not have the original costume poking through

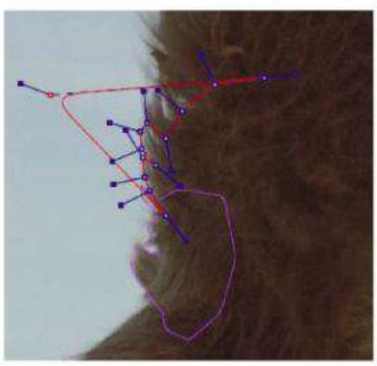


Mocha with the grid on, which shows you how your track is holding

practice there are issues. The biggest is that Mocha doesn't have any standalone paint or clone tools. This means that if Mocha can't fully create a clean plate it will track in what it can, which may still have some of the original pixels poking through.

Imagineer has got around this problem by introducing an option to import a clean frame as part of its compositing features. This enables you to clean up a frame in another package and then bring that back into Mocha. This works well – but why track, realise you haven't quite got a perfect clean frame, go into Nuke, create a clean frame, bring that back into Mocha and then re-track and re-render? Mocha's tracking is so good that it makes much more sense to track in that software, export the tracks and then composite everything in another package where you have many more options.

This takes us nicely on to some of the new compositing features in Mocha Pro. Now, once you have your track, you can bring in your patch and comp this into your scene. Mocha does a great job of tracking and comps in the photo effectively, but we don't think any film company would use this technique in the real world. A full compositing package, such as Nuke, gives you much more freedom and versatility in terms of what you're going to patch. Things change rapidly in the film industry, and having the freedom to just export the tracks into Nuke enables you to easily change the patch at a later date.



This example of Mocha's X-spline shows how it's always a connected loop, which can hinder refined roto

## ROTOSCOPING TOOLS

The X-spline in Mocha is used for rotoscoping objects. Here, the spline is a continuous loop – in other roto packages, such as Silhouette or even Shake and Nuke, the spline is open and you connect it together once you've finished drawing around your shape. Mocha's spline is perfect when you're tracking a surface object, where you normally wouldn't need more than five or six points. However, if you were trying to use Mocha as a fully fledged roto tool, having it continuously connected could present problems. As a professional roto artist, if you're creating a full body matte of a man walking, for example, you'll split him up using as many splines as required. Just for a hand, you'd need one spline for the palm, one for the wrist and possibly three for every finger, depending on the movement. That's up to 17 splines just for one hand.

Mocha's roto tool seems a little clunky and getting the amount of detail needed can be tough. When connected to a track, the splines behave as expected, but when finessing, the spline points seem heavy and don't always act as you'd like. We'd use Mocha Pro to roto solid objects that have no ergonomic movement, such as a building or furniture, but would find it time-consuming and tough to get film-quality roto mattes from natural objects.

Mocha Pro is a superb tracker and fixes problems that some artists find impossible to track in other software. Unfortunately, we can't see anyone in film using the roto, clean frame or composite tools. For small companies that are working on commercials or vox pops, these will be a life- and time-saver, but they don't give you the freedom, features or quality that you'd need in the film industry. ■

## 3D WORLD VERDICT

**PROS**

- Superb planar tracker
- Easy and quick to use
- Great package for small companies

**CONS**

- Unnecessary tools for large companies
- Time-consuming imports into Nuke
- No paint tools

**For individuals and small companies, Mocha Pro will solve many problems. It's by far the best planar tracking and simple compositing software out there. Larger film VFX companies need not upgrade**

Hardware
Workstation

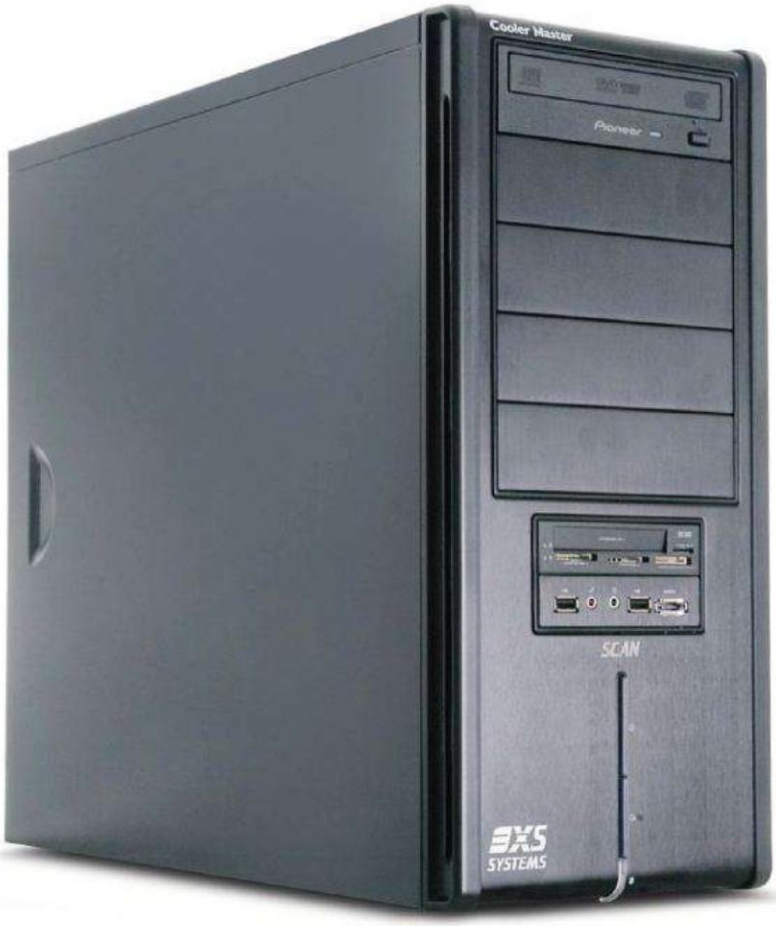
**PRICE**
£1,333 / $2,071 / €1,575

**PLATFORM**
Windows / Mac

**MAIN FEATURES**
- 3.4GHz Intel Core i7 2600K CPU, enhanced to 4.5GHz
- 8GB DDR3-1600 SDRAM
- 1GB Nvidia Quadro 2000 graphics
- 120GB OCZ Vertex 2E SATA SSD
- 1TB Western Digital Caviar Black hard disk
- Sony Optiarc 24x DVD rewriter
- 7-in-1 memory card reader
- Windows 7 Professional 64-bit
- Ports: 4 x USB 3.0, 14 x USB 2.0, 1 x LAN, 2 x eSATA, microphone input, 7.1 surround audio output, optical audio input and output
- Warranty: Two years parts and labour, first year onsite, second RTB

**MANUFACTURER**
Scan

**WEBSITE**
scan.co.uk




Scan's 3XS 2600K is a powerful and comprehensively featured workstation that shows off its processor's impressive potential

# Scan 3XS 2600K

## Intel's latest processor powers Scan's new machine to a high level of performance for the money, as **James Morris** discovers

Intel's relentless, tick-tock approach to processor design specifies a new processor architecture every other generation, alternating with a shrinking of the overall component size. So we've had two generations of Nehalem – with the last one being a smaller, more efficient version – and now we have a new architecture codenamed Sandy Bridge. First to show us what it can do is Scan, with its 3XS 2600K.

The 2600K in the name refers to the processor, which is the top Sandy Bridge Core i7 running at a nominal 3.4GHz. This is a quad-core processor with the same performance-enhancing features as the last few generations. These include Hyper-Threading, which presents each physical core as two virtual ones, and Turbo Boost, which allows the frequency of individual cores to increase under load, up to 3.8GHz in the case of the 2600K.

The K indicates that the processor's settings are unlocked, so it can be permanently set to a higher frequency for improved performance. As is increasingly the case with workstation manufacturers, Scan has taken full advantage of this capability, and supplies the 3XS 2600K with its CPU preset to a truly whopping 4.5GHz. This setting is tested for 48 hours before dispatch, and is fully covered by the two-year warranty. The fast processor speed promises truly exceptional rendering power. Scan has partnered the Intel processor with 8GB of 1600MHz DDR3, supplied as two 4GB modules, and there are also two DIMM slots free for later upgrade.

### INTEGRATED GRAPHICS

One of the key enhancements of the Sandy Bridge CPUs isn't that relevant for 3D content creation, however. The new chips have graphics integrated onto the actual die – but a 3D workstation will require far more powerful discrete graphics, so the onboard GPU won't be used. In the case of the 3XS 2600K, Scan supplies the new mid-range Nvidia Quadro 2000, which offers 192 CUDA processors and 1GB of GDDR5 RAM. This puts it close to the high-end Quadro FX 4800, although memory bandwidth is about half as much.

Despite the sub-£1,500 price, the 3XS 2600K still manages to pack in comprehensive storage provision similar to more expensive workstations. There's a 120GB OCZ Vertex 2E SSD providing super-fast reading and writing for the operating system and apps. For more general data, a conventional 7,200rpm 1TB Western Digital Caviar Black hard disk is supplied. Rounding things off, there's also a 24x Sony DVD rewriter and 7-in-1 memory card reader.

To put the 3XS 2600K through its paces, we ran Cinebench R11.5 as well as SPECviewperf 11. The Cinebench CPU score of 8.72 is only slightly behind the rendering ability of more expensive six-core systems, and although the OpenGL score of 44.1 can't match workstations sporting the latest high-end accelerators, it's still impressive. Of the SPECviewperf results, the lightwave-01 score of 45.12, and sw-02 score of 36.42 in particular display solid abilities for 3D animation and product design.

Scan's 3XS 2600K shows the potential of Intel's new Sandy Bridge processor, although it does require pushing the clock frequency beyond the nominal setting to get the most benefit. The rest of the specification is extremely comprehensive, with Nvidia's Quadro 2000 punching above its mid-range classification for 3D graphics acceleration and every storage requirement catered for. This is a powerful, fully featured workstation for the money. ■

## 3D VERDICT

**PROS**
- Offers huge rendering performance for the price you pay
- Rapid graphics
- Includes comprehensive fixed and removable storage provision

**CONS**
- The Sandy Bridge CPU is currently only available with four cores

**Plenty of processing power, thanks to the huge clock frequency potential for Intel's new Sandy Bridge architecture, with a finely balanced specification backing it up**

About the author
James Morris has tracked the rise of every new development, from OpenGL accelerators to multi-processor workstations, over more than 15 years of testing 3D content creation hardware

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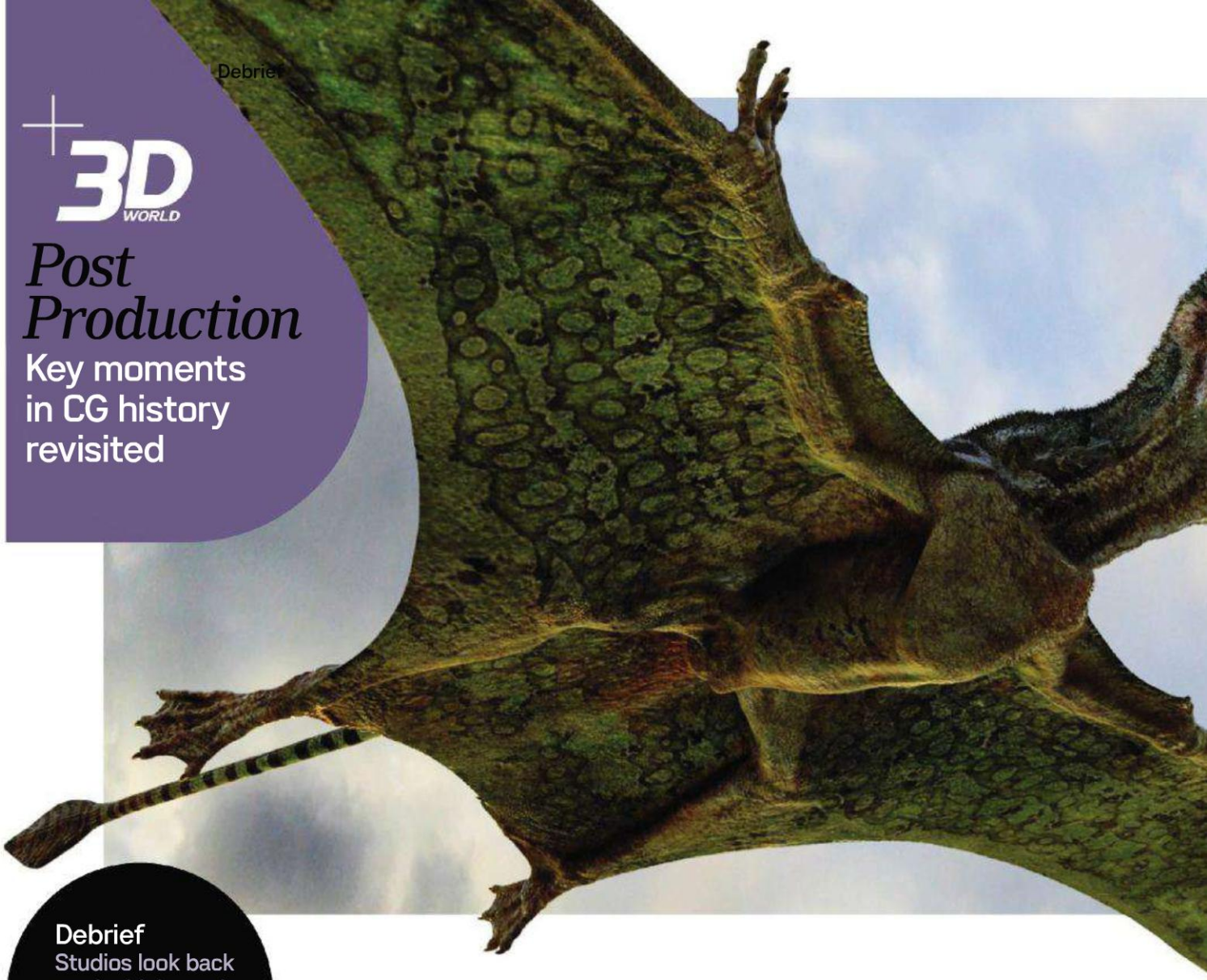
3D WORLD

# Post Production

Key moments in CG history revisited



**Debrief**
Studios look back on the highs and lows of recent commercial jobs

# Off to a flying start

## ZOO's head of production, James Prosser, explains how the studio brought dinosaurs to life in an ambitious stereoscopic documentary for Sky 3D

**VITAL STATISTICS**
Studio ZOO, in association with Molinare, Fido, CVFX and Nvizage
Title Flying Monsters 3D with David Attenborough
Format Stereoscopic feature documentary for television, cinema and IMAX
Release date December 2010 on Sky 3D, IMAX release spring 2011
Client Atlantic Productions
Production Anthony Geffen
Edit production Martin Williams
Software used Primarily Maya, Nuke and ZBrush

**About the author**
James Prosser is VFX producer and head of production at ZOO. Previously, he was a VFX producer at MPC on projects such as Harry Potter and the Prisoner of Azkaban and The Chronicles of Narnia: Prince Caspian. ZOO's recent credits include David Attenborough's First Life
www.zoovfx.com

Flying Monsters 3D is a stereoscopic feature documentary in which David Attenborough sets out to uncover the truth about the enigmatic pterosaurs that took control of the skies 220 million years ago, when dinosaurs were beginning their domination of Earth.

It was a groundbreaking and ambitious project, as Sky 3D's first factual commission, and a unique collaboration because the film was being produced by Atlantic Productions for both 3D TV and giant-screen cinema.

ZOO has a long history of working with Atlantic Productions and was involved in discussions about the project very early on. We were active in the pitch to Sky, where we presented some stereoscopic tests that we'd been developing. It wasn't long before the production was given the green light, the only issue being that Sky wanted to broadcast the show in December. This meant that the schedule for the whole project was less than a year, and it was April by the time the editorial content of the film was sufficiently locked down for the CGI to be fully commissioned.

### What we did right

*1. We brought the right team together*

With the time constraints and with other projects underway, we immediately knew that we wouldn't be able to grow our team at ZOO to meet all the demands of the project in time. We therefore needed to work in collaboration with other companies to get the right

The programme reveals the truth about pterosaurs, which ruled the skies from 220 to 70 million years ago

Collaboration was key to Flying Monsters 3D's success: to bring these scavenging giants to the screen, ZOO worked in association with a range of other companies

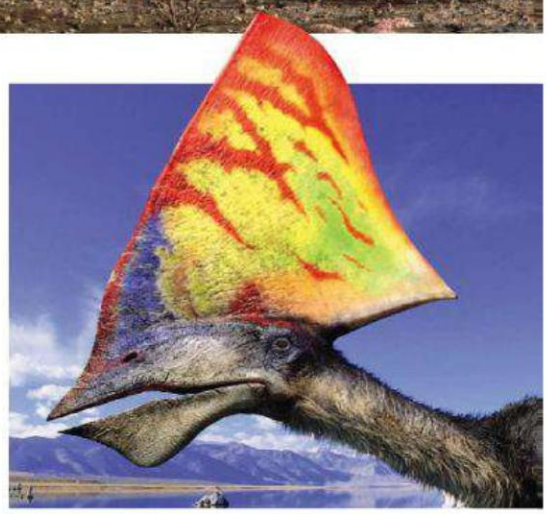
expertise in place as soon as possible. We began discussions with Molinare, Fido and CVFX to take on various parts of the work. Robin Aristorenas was also brought on board as VFX supervisor and stereoscopic consultant. Quickly bringing these individuals together made a huge difference to the project.

*2. Our storyboarding, pre-viz and planning*
We worked closely with the production team from day one on deciding what the story needed and how best to achieve it. Having a strong relationship with the production company was key to this process. We storyboarded scenes a number of times and then worked with Nvizage, who turned around a high-quality pre-viz in a very tight timescale. Time at this stage was a huge consideration. We also pre-viz'd a number of scenes involving live action and CG. The most complex of these involved a helicopter shoot of David Attenborough in a glider with CG creatures flying alongside and around him. Everything had to be planned with absolute precision for the sequence to work, and for the filming to be completed safely. The pre-viz was accurately followed on the shoot, enabling shots to be completed as planned.

*3. We went all CG where possible*
When creating worlds for the CG creatures, we were obviously limited in options for shooting live-action backplates. For a number of sequences where we did have to make a decision, we opted to go all CG. Environment builds and rendering time were offset by reduced compositing time. From our experience on other shots involving live action and CG mix, we're glad of that decision. Many of the live-action backplates needed stereoscopic alignment and grade fixes, and in many cases paint work. Much of this had to be completed before any real VFX could start. When compositing, we had to go through a number of iterations on shots to ensure the CG and live action were absolutely in alignment. This was especially tricky for the shots that had detailed undulating live-action ground on which the CG creatures had to walk.

*4. We worked closely with scientific advisors*
Throughout the asset build process, we had daily Cinesync sessions with the scientific researchers and experts to ensure all models and animations were as accurate as possible. This was quite a time-consuming process, »

*"The most complex live action and CG scene involved a helicopter shoot of David Attenborough in a glider with CG creatures flying alongside and around him"*



The Brazilian pterosaur, Tapejara, features a large bony crest, providing ZOO with some artistic licence when it comes to texturing

A close up of the Dimorphodon shows the fantastic texture detail created using ZBrush. A wet shader is used to add glisten to the skin

Anchiornis look development. The studio consulted with experts to ensure its designs were accurate

The colour map for Dimorphodon, based on real-world lizards and scientific 'best guess'

but I can say that the work has benefited hugely from that interaction, especially the animation and rigging process.

## The challenges

*1. Stereoscopic production for many formats*
Producing a project for multiple stereoscopic formats – TV, cinema and IMAX – was always going to be challenging. Original photography was 4K 16:9 on Reds. To create the IMAX 4:3 version, we cropped the 16:9 picture to get the best 4:3 framing. With the all-CG sequences, we worked 4:3 and took a 16:9 crop (usually bottom) of frame to get the 16:9. This enabled us to maintain maximum resolution for IMAX and ensure there was no loss of image. All of this involved a lot of double thinking during shot setup to make sure we achieved good framing for both formats.

*2. Coordination of multiple vendors*
With artists and clients in various locations, we needed a central shot-tracking system that everyone could access to review material and post comments. For this we utilised a web-based system developed by CVFX and Molinare, which saved us a huge amount of time. Skype and Cinesync were also used to the full.

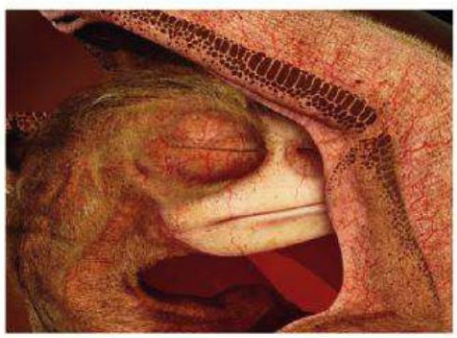
*3. Script and story changes impacting VFX*
As ever when working on projects, editorial changes late in the schedule meant that we had to think and plan rapidly to make sure we could deal with as many of the requests as possible, remain within budget and produce the quality of work we all wanted to create. This is true for almost every project, but even more so for this one due to the complexity and timescale.

## Lessons learned

Despite all the vast experience of everyone brought together, the ambition and complexity of the Flying Monsters 3D project inevitably meant that it was a huge learning curve for most of the team.

Working with live-action stereo material presents an array of problems at this stage of the medium's development, even with the best crew there is. The fact that two separate cameras are capturing the material (and one of them is shooting through a mirror) means there are always going to be minor discrepancies with the footage that need to be fixed in post.

Finally, although there are numerous things to take into consideration when working stereoscopically, with the right approach it needn't be scary or difficult. The results are very exciting. ●



A selection of ZOO's final images for the project. From top to bottom: Darwinopterus at dusk, a pterosaur embryo and Tapejara 'sailing'

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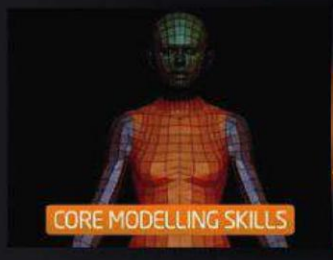






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Matt McKinney says that some of the heaviest shots were cloud vistas featuring shoals of fish: "We really pushed the quality with volumetric ray-traced shadows, and so each frame took four to five hours to push through in mental ray. It certainly tested our render farm."

**Freeze Frame**
Key moments in VFX and animation history revisited on DVD

# Doctored images

## The Mill tells Mark Ramshaw about the Dickens of a time it had bringing clouds, sharks, spacecraft, and seasonal sparkle to the latest Doctor Who Christmas special

The handover from one Time Lord to another is always a momentous occasion, but Matt Smith's introduction signalled a far more fundamental change in the show's DNA. Behind the scenes, out went Russell T Davies and his production team, and in their place came a crew helmed by Steven Moffat, a writer known for some of new Who's most admired scripts (not least Blink and The Girl In The Fireplace). That DNA is especially visible in the most recent Doctor Who Christmas special: A Christmas Carol. Cleverly blending seasonal sentiment with intricate time-twisting plotting, it provides sharp contrast to the blockbuster-style specials of the last few Christmas shows. Not that the more intimate style of storytelling necessarily made things any easier for visual effects vendor The Mill.

"Russell T Davies always wanted something very big and bold for Christmas Day, with high action and big chases, whereas this carried a different type of pressure," says Matt McKinney, The Mill's 3D supervisor for Doctor Who. "With something like a giant Cyberman robot, you can actually get away with a bit more, whereas everybody knows what a shark looks like, so there's less leeway."

As a one-off show, The Mill had the luxury of spending a little more time on A Christmas Carol than for a series episode. Yet only two of the 16-strong team were working on the 80-odd 3D shots for the entire three months. And as McKinney points out, even that isn't such a long time once you subtract the time spent on initial meetings and compositing/grading at the back end, particularly with the team's need to work closely with the client. "With a new production team, it's been a little like going back to the beginning again in terms of building relationships."

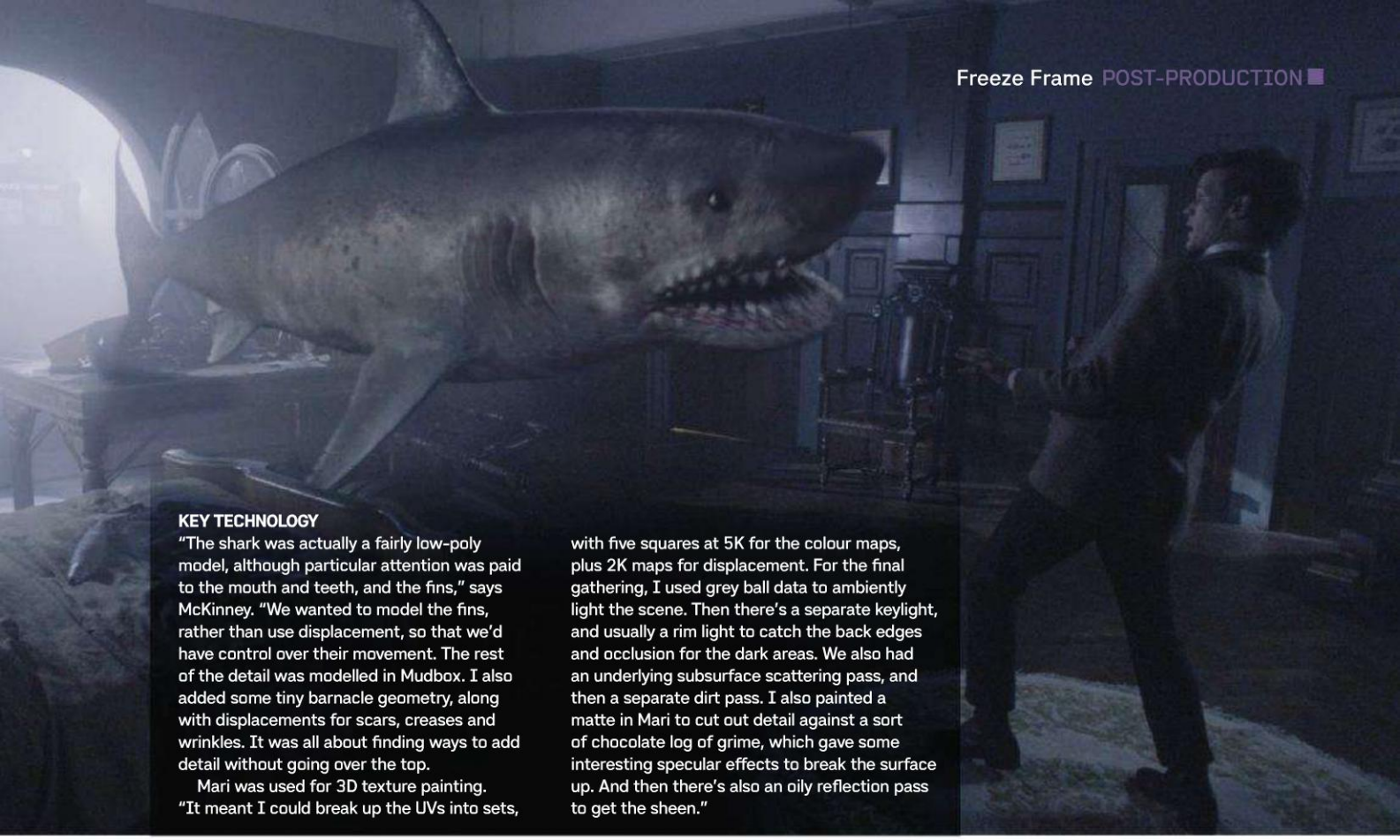
This particular episode included multiple CG cloud sequences, the creation of a gigantic space liner, plus shots of fish and a vicious shark that swims through air, rather than water. "Even though we've handled clouds before, we always try to improve, so we knew we'd need some R&D time for that," says McKinney. "We could have come up with a simpler particle-based solution, but we ultimately decided to use Maya Fluids instead. That added to the pressure with regards to getting expensive renders through, so we needed to find a way to get the maximum quality while still keeping the times acceptable."

McKinney says that three different cloud sequences were used, each relying on a slightly different approach. Ruben Bautista developed the initial cloud system for shots of the main city down on the planet surface, as well as the spaceship descent. Nick Webber then used a different Maya fluids setup for several 'vista' shots, in which the clouds are viewed closer to ground from the airborne Tardis. Finally, Andy Guest created shots depicting the entire planet masked by cloud, whirlwinds and tornados using dynamic Maya Fluids, with movement driven by nParticles.

"We'd have liked a dynamics system to show the clouds

"The fish modelling was quite straightforward. We had three different resolutions to help us with the shoal shots, for which we used particle systems for the animation," says McKinney

**VITAL STATISTICS**
Title Doctor Who – A Christmas Carol
Released
US: 15th February
UK: 24th January
Formats DVD and Blu-ray
Distributor
UK: 2entertain
US: BBC Video
Watch for... The Doctor's face-to-face meeting with the shark as it hovers menacingly inside a young boy's bedroom



**KEY TECHNOLOGY**

"The shark was actually a fairly low-poly model, although particular attention was paid to the mouth and teeth, and the fins," says McKinney. "We wanted to model the fins, rather than use displacement, so that we'd have control over their movement. The rest of the detail was modelled in Mudbox. I also added some tiny barnacle geometry, along with displacements for scars, creases and wrinkles. It was all about finding ways to add detail without going over the top.

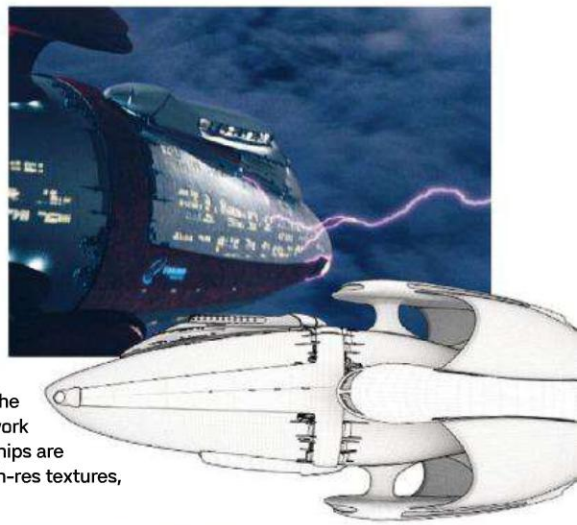
Mari was used for 3D texture painting. "It meant I could break up the UVs into sets, with five squares at 5K for the colour maps, plus 2K maps for displacement. For the final gathering, I used grey ball data to ambiently light the scene. Then there's a separate keylight, and usually a rim light to catch the back edges and occlusion for the dark areas. We also had an underlying subsurface scattering pass, and then a separate dirt pass. I also painted a matte in Mari to cut out detail against a sort of chocolate log of grime, which gave some interesting specular effects to break the surface up. And then there's also an oily reflection pass to get the sheen."

parting as the ship flies through it, but it just wouldn't have been possible for this project," says McKinney. "Instead, we relied on texturing to provide the cloud animation in those shots."

In addition to his supervising role, McKinney handled the modelling and animation of the show's feature creature, the flying shark.

"There were two different aspects to the work," he says. "When the shark is in the room with the Doctor, it's more of a texture and rendering exercise. For the flying rickshaw, it was more about getting the tracking, speed and flow right."

While it looks convincing, the shark model wasn't designed to be anatomically correct. "It was such a balancing act. They used a prosthetic on set for some shots, for example, so we had to match that. And while we wanted to stay within the realms of realism, I also wanted to make him a little more scary, so I did exaggerate the mouth. I think with any Who creature you need to give a little sense of fear, with a few moments that will make the viewer jump."

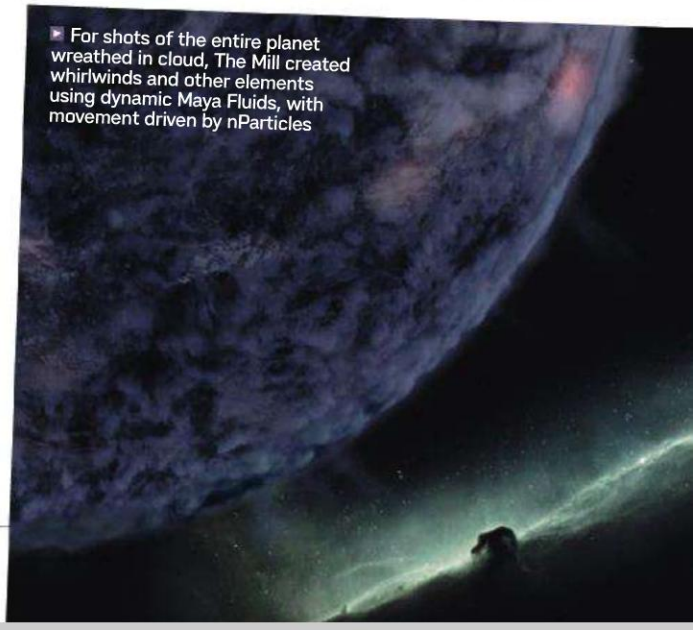


The concept design, wireframe model and final shot of the starliner as it descends through thick cloud. "We started work on the spaceship quite early," says McKinney. "These big ships are always quite complex. Without all the small details and high-res textures, you just don't get that sense of scale."

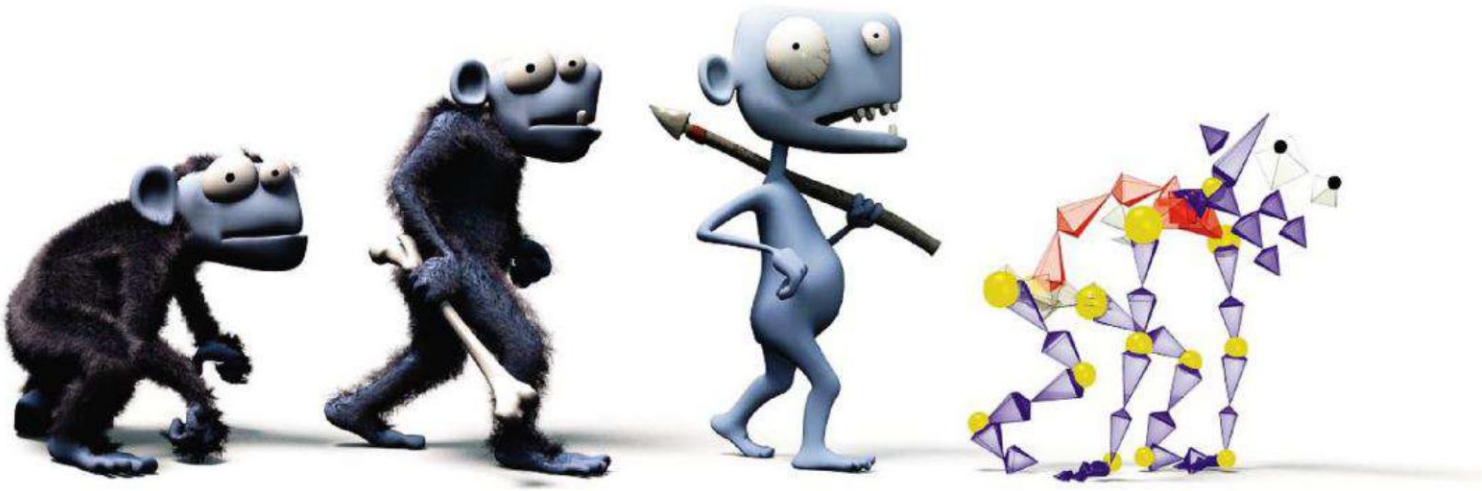
*"With a giant Cyberman robot, you can actually get away with a bit more, whereas everybody knows what a shark looks like"*

**Matt McKinney, 3D supervisor, The Mill**

While every project inspires a desire to produce the best possible work, McKinney admits that working on Doctor Who carries an even greater weight. "With such a hardcore fanbase and so many millions of viewers, there's such a sense of responsibility. I remember starting work on the show six years ago, coming into the office and hearing the sound of the Tardis. It was the first time I'd heard it since I was a kid, and it gave me such a massive adrenaline rush. The show still gives me that same feeling."



For shots of the entire planet wreathed in cloud, The Mill created whirlwinds and other elements using dynamic Maya Fluids, with movement driven by nParticles



# Monkey business

## The steady march of technology just helps the layman produce more junk more quickly – and Roy's worried that real-time rendering will make a monkey of us all

Can there be anybody who didn't die a little bit inside at the news that an extra 17 minutes of 2001: A Space Odyssey has been unearthed? Worship Stanley Kubrick as one of great auteurs all you like, but there's no getting around the fact that the reason 2001 is so well-loved by hippy types is that you need to have ingested industrial quantities of recreational drugs to find its treacle-slow story and psychedelic ponderings remotely bearable. Haven't seen the movie yet? Here's the entire plot: apes get a leg-up from aliens. Man heads into space. Man has some computer trouble. Man meets aliens. There, I've just saved you from 160 minutes of utter tedium.

The thing is, I'd welcome the missing footage if it showed how the apes really climbed the evolutionary ladder so quickly. In the original version, Kubrick fobs us off with a fancypants match-cut. You know, the famous one with the metaphorical handover from an ape throwing his new bone mallet up into the air to a spaceship sailing through the void many millennia later. Now, I'm all for snappy editing, but that whole bone-into-space routine is a big, dirty cheat.

*"Pretty soon there'll be nothing left to stop the great unwashed from unleashing a tsunami of second-rate animation"*

Kubrick would like us to believe that once one monkey had been turned into some kind of prehistoric Schwarzenegger, the other damn dirty apes would immediately grasp the concept of weapons usage. Minutes later, they'd have invented fire, language and fine tailoring, and by sundown would all be sat around a gigantic banquet table quoting Wittgenstein and arguing about what sort of tip to give the waiter. Bollocks. What really happens when you put some newfangled technology into the hands of the uneducated masses is that you make it easier for them to underperform. The whole process of producing crap simply becomes more efficient, resulting in even more crap than ever before.

Think that's harsh? Just look at the World Wide Web, stuffed to bursting with pointless and inaccurate drivel from illiterate bores who think having a Wi-Fi connection and a Twitter account automatically turns them into some post-Truman Show Z-list celebrity. It's the same in the design world. Remember the bad old days when Apple unveiled those first Macs to the world? Sure, it revolutionised things for real Soho creatives, but what about all the other dross we had to put up with? Suddenly, any aspiring artist with a token degree from some backwater college could churn out posters, booklets, book covers and other spurious home-printed 'art'. And by god that's just what they did, arguably setting back the digital design revolution by a good half-decade.

Brace yourself, because it's about to happen all over again. Yeah, yeah, I know I should be overjoyed of the advent of automatic rigging programs, low-cost mocap, real-time previews and ultra-fast rendering. But the consequences are almost too awful to contemplate. At the moment, CG is a slow, painful process, but pretty soon there'll be nothing left to stop the great unwashed and untalented from unleashing a tsunami of second-rate animation. The internet will become host to almost as much duff homegrown CG footage as it is to duff homegrown video. And you won't be able to move for 'here's one I made earlier' showreels. If you're reading this and currently hold down any kind of recruitment or university admissions job, then you might as well pull the trigger to end the misery now.

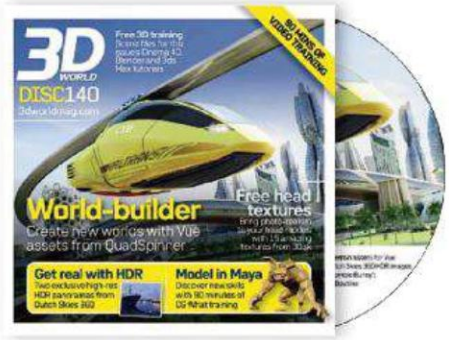
I like the fact that CG is slow and painful. Take away the need for years of training and the patience of a saint and what are you left with? The lunatics will take over the asylum, for one thing. But worse than that, bang goes the unique selling point that's been keeping me and the other old animation industry farts in gainful employment all these years. A misanthropic Roy is one thing. But a misanthropic, jobless Roy? God help you all.

**About the author**
Mental Roy has been lurking on the fringes of the 3D industry for years – usually fringes that contain pubs. We could tell you his real name, but then we'd have to kill you
**3dworldmag.com**

3D WORLD

# On the disc

Essential assets and training for every 3D artist




## This issue:

90 minutes of Maya video training, two exclusive HDR scenes, 15 photoreal head textures plus Vue scenes and materials

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## CG What 'Zombie Bunny' training

90 minutes of video for all Maya modelling artists

CG What provides online video training with a focus on Maya, covering everything from modelling to animation and rendering, with loads of different topics to keep everything enjoyable as you learn. You can sample every tutorial with a free first chapter before signing up for membership to complete the rest of the chapters. There's also an active forum and gallery where you can meet and learn from other Maya artists.

The video on this issue's disc demonstrates the accessible nature of CG What's training approach to fine effect. Over 90 minutes, Kurt Boutilier shows you how to model a fun zombie bunny character. He starts by explaining to set up reference images and correctly configure your scene file to ensure accurate scaling, before going on to block out the character's main forms. Later, Kurt goes into detail on modelling hands. All the tools he uses are explained, and you'll also gain insight into technical decisions that will set you up to model your own projects.

Sign up for membership at CG What for the remainder of the video for this project, which includes shaping the face, adding details and finishing touches.

FORMAT MP4

LICENCE Non-commercial

WEBSITE cgwhat.com

## Dutch Skies HDRI

### Two panoramic photo scenes

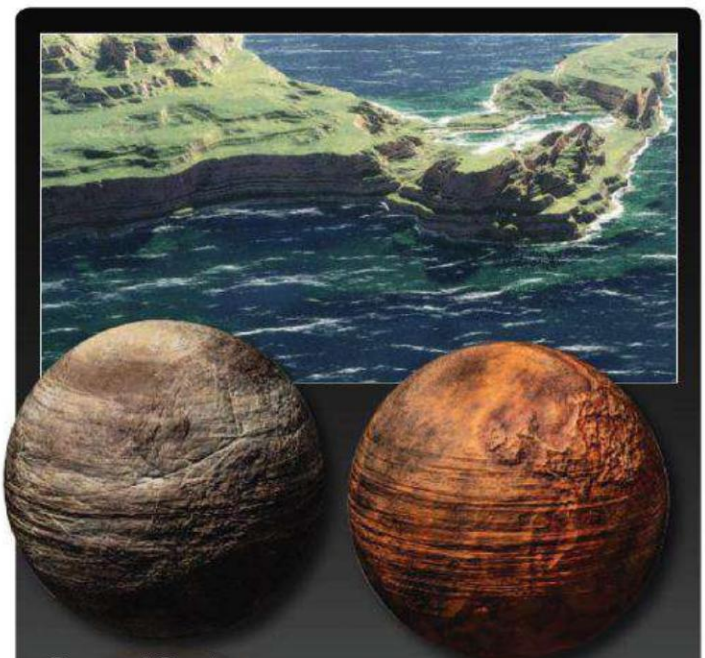
Exclusive to 3D World, these two HDR scenes are ideal for backplate and lighting use. They come from Bob Groothuis, a photographer who specialises in panoramic photography.

**READER OFFER** Until 1 March, you can download 11K exposures of these two HDR scenes: visit **3dworldmag.com/140** to find out more.

FORMAT HDR

LICENCE Commercial

WEBSITE bobgroothuis.com



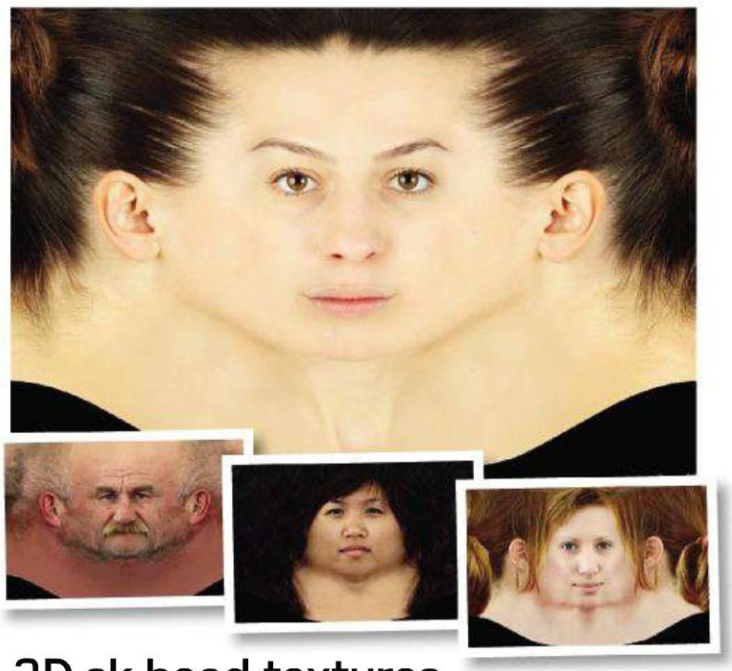
## QuadSpinner assets

### Scenes, materials and HyperTerrains for Vue

Founded by the well-known Vue artist Dax Pandhi, QuadSpinner offers content for Vue artists, along with expert video training. To mark the launch of QuadSpinner's revamped website and store, the disc includes three complete scenes, plus sandstone materials and arch HyperTerrains.

FORMAT Vue LICENCE Commercial

WEBSITE quadspinner.com



## 3D.sk head textures

### 15 photo-based designs for character models

3D.sk is renowned for its photo reference content, with over 200,000 high-res images available to download through an affordable membership scheme; prices start from €25 a month. The 15 textures on the disc show the high standard of its work: featuring 3K x 2K resolutions, each image is designed to wrap around a 3D character's head to bring instant photo-realism to your models.

FORMAT JPEG LICENCE Commercial

WEBSITE 3d.sk

# On your free disc

**THIS ISSUE** 90 minutes of modelling training for Maya; scenes, materials and HyperTerrains for Vue; photo-based head textures; and high-res HDRI

**Explore your disc**
If the disc does not run automatically, double-click the 3DW.osx or 3DW.exe icon to launch the interface

## Resources

### QuadSpinner assets for Vue
Three complete scenes, plus a selection of sandstone materials and HyperTerrain arches for your own desert scenes

### Dutch Skies 360 HDR images
Exclusive to 3D World: two HDR panoramas for use in backdrops and lighting, including a preview of the new Dutch Light series

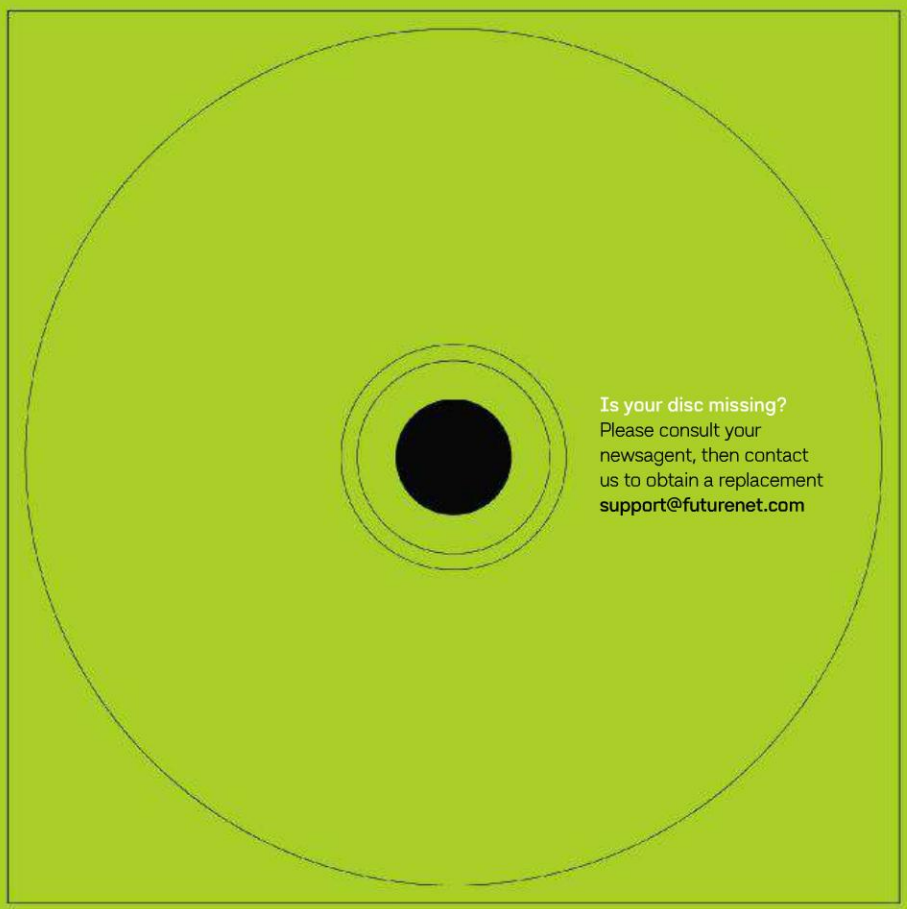
### 3D.sk head textures
15 photo-realistic, high-resolution wraparound textures for character models from this photo-reference specialist

## Video training

### CG What 'Zombie Bunny'
90 minutes of Maya modelling tricks and techniques from Kurt Boutilier

## Tutorials

Project files for this issue's Cinema 4D, Blender and Fundamentals tutorials can be found on the disc. Q&A scene files are available via **3dworldmag.com/140**



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For a full listing of our disc content this issue, including file formats and system requirements, **turn to page 112**

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Tom Johnson - Senior Artist
Glowfrog Studios

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